SCHOOL OF SCIENCES

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DEPARTMENT OF BIOTECHNOLOGY & MICROBIOLOGY

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
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Department of Life Science
School of Sciences
Attendance Sheet of the Board of Studies held on 19th June 2019

Meeting of Board of Studies in Department of Life Science for B.Sc Biotechnology and Microbiology School of Sciences of ITM University Gwalior held on 19th June 2019 in the PCB TF 405, Turari campus, ITM University Gwalior.

The following members were present:

S.No	Name of Faculty	Designation	Signature
1.	Dr. Richa Kothari	Dean, School of Sciences	Richa Kothari
2	Dr. R.K.Khare	External expert (HOD Microbiology) Govt. Model science college, Gwalior (M.P)	RKhare
4.	Dr. Sonia Johri	HOD, Dept. of Life science, School of Sciences	S.Johri
5	Prof. Santosh Sharma	Special invitee	Sharma
6.	Dr. Sujeet Kumar Mrityunjay	Member	Sujeet Mrityunjay
5	Mrs. Trapti Pathak	Member	Pathak

Richa Kothari

Dean
Prof. Richa Kothari
Professor & Dean
School of Sciences
ITM University, Gwalior (M.P.)

Copy to:
1.Hon'ble Vice Chancellor
2. Registrar
3. Dean Academics For kind information
4. Concern Member

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Department of Life Science

Minutes of the Board of Studies held on

19th June 2019

The chairman and coordinator welcomed the members of the board and outlined the changes to be made with the approval of the board as given here under.

1. Minutes of previous Board of studies were reviewed.

2. It is decided to incorporate necessary changes in the syllabi of following programmes for AY 2021-22.

- Changes has been incorporated in the syllabus of BSBT/MB 101 Fundamentals of Biochemistry, BSBT/MB 102 Bioinstrumentation, BSBT/MB 103 General Microbiology, BSBT/MB 105 Animal Diversity, BSBT/MB 106 Plant Diversity and the syllabuses were revised in the first semester.

- Changes has been incorporated in the syllabus of BSBT/MB 202 Molecular Biology, BSBT/MB 206 Plant physiology, and the syllabuses were revised in the second semester.

- Changes has been incorporated in the syllabus of BSBT/MB 301 Animal tissue culture, BSBT/MB 305 Genetics, and BSBT/MB 307 Disaster management the syllabuses were revised in the third semester.

- Changes has been incorporated in the syllabus of BSBT/MB 401 Genetic engineering; Tools and Techniques, BSBT/MB 403 Enzymology, and BSBT/MB 406 Plant ecology the syllabuses were revised in the fourth semester.

- Changes has been incorporated in the syllabus of BSBT/MB 501 Organic mechanism in Biology, BSBT/MB 502 Environmental Biotechnology, and BSBT/MB 503 Genomics and proteomics the syllabuses were revised in the fifth semester.

- Changes has been incorporated in the syllabus of BSBT/MB6 Waste management, BSBT/MB 602 Food Microbiology, and BSBT/MB 603 Frontiers in biotechnology, the syllabuses were revised in the sixth semester.

Annexure 1: Changed syllabus attached

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Board of studies recommended the above resolutions to be presented in the Academic Council for further approval.

*As per the University Norms changes can be made accordingly.

Read and confirmed.

Dr. R.K. Khare External Expert BOS	**Dr. Richa Kothari** Chairperson (Dean School of Sciences) BOS	**Dr. Sonia Johri** HOD, Life Science
Mrs. Trapti Pathak Member (BOS)	**Dr. Sujeet Kumar Mrityunjay** Course Coordinator Microbiology	**Dr. Santosh Sharma** Special Invitee

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Syllabus-2019-2020

(SOS)(BSc_Biotechnology)

Title of the Course	Fundamentals of Biochemistry
Course Code	BSBT 101 (T)

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	Knowledge about basic chemistry and science			Co-Requisite/s				
Course Outcomes & Bloom's Level	**CO1-** To remember the structure of various biomolecules like carbohydrates, fats, amino acids, etc**(BL1-Remember)** **CO2-** To comprehend the biological material; and its relation to living matter and elaborate the structure and functions of different biomolecules**(BL2-Understand)** **CO3-** To understand the importance of biophysical chemistry and its applications.**(BL3-Apply)** **CO4-** To provide experimental basis, and to enable students to analyze the various biomolecules in food samples. **(BL4-Analyze)** **CO5-** To evaluate the applications of biomolecules in various fields such as research and industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Bonds in biological system: Principles of biophysical chemistry (ph2Henderson Hasselback equation) Buffers and its role in biological systems. Solution and its types. Osmosis, diffusion and its significance in biological systems. Difference between osmosis and diffusion.	Tutorials, Collaborative, Demonstrations, Project methods Experiments	8
2	Carbohydrates: Monosaccharide: Classification, Common Disaccharides, Structure and occurrence of storage and structural polysaccharides	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments	9
3	Lipids: Classification, structure-function, role in biological membrane, Lipoprotein, structure and functions. Prostaglandins and its role in biological systems	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments,	9
4	Amino Acids: structure, nomenclature and general properties, Peptide bond, Classification of amino acids Proteins; Levels of organization Primary, Secondary structure, domains, motif and folds)., tertiary and Quaternary Conformation of proteins (Ramachandran plot, Stability of Proteins	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	9
5	Composition, structure and function of nucleic acids. Conformation of nucleic acids (helix (A, B, Z), t-RNA,	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	9

	micro-RNA). Vitamins: Classification: source and biochemical function, RDA. Nucleic acids: DNA, RNA- basic structure (nucleosides and nucleotides): double helical structure of DNA (Watson - Crick Model), types of DNA, B-, A- and Z-DNA.		

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Quantitative analysis of sugar in the given plant sample	PBL	BL4-Analyze	4
2	Qualitative analysis of sugars.by Molisch's Test	Experiments	BL4-Analyze	2
3	Qualitative analysis of reducing sugars by Fehling's Test	Experiments	BL4-Analyze	2
4	Qualitative analysis of sugars.by Barfoed's Test	Experiments	BL4-Analyze	2
5	Qualitative analysis of ketose sugars by Seliwanoff Test.	PBL	BL4-Analyze	2
6	Qualitative analysis of amino acids by ninhydrin Test.	Experiments		2
7	Qualitative analysis of peptide bond by Biuret Test	Experiments	BL5-Evaluate	2
8	Qualitative analysis of protein by Xanthoproteic Test.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

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

Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	U Satyanarayan,U Chakrapani Biochemistry 3rd Edition
Articles	https://www.mdpi.com/1422-0067/22/22/12219
References Books	G.Zubay Biochemistry 3rd Edition
MOOC Courses	https://nptel.ac.in/courses/104105076
Videos	https://nptel.ac.in/courses/104105076

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_Biotechnology)

Title of the Course	Bio-Instrumentation
Course Code	BSBT 102 (T)

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	The course prepares the student to understand the Bio-Instrumentation; and how doesnit interacts with living and non-living molecules. and how it predicts their structure and function.		**Co-Requisite/s**	The subject Fundamental of Bio-Instrumentation is designed for graduate biotechnology students to understand the basic concepts of every part of Bio-Instrumentation and their types. the course aims to provide the basis for analyzing the applications of Bio-Instrumentation in various fields such as research and industries				
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the Bio-Instrumentation; and how does it interacts with living and non-living molecules. and how it predicts their structure and function.**(BL2-Understand)** **CO2-** The subject Fundamental of Bio-Instrumentation is designed to under graduate students of biotechnology for understanding of basic concepts of each and every part of Bio-Instrumentation and their types. **(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding.**(BL4-Analyze)** **CO4-** The course aims to provide basis of analyzing the applications of Bio-Instrumentation in various fields such as research and industries.**(BL4-Analyze)** **CO5-** To apply the understanding of Bio-Instrumentation in evaluation in various Biological Samples and to evaluate the applications of Bio-Instrumentation in various fields such as research and industries **(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕		**SDG (Goals)**	SDG4(Quality education)				

	Human Values ✕ Environment ✕		

Part B

Modules	Contents	Pedagogy	Hours
1	Centrifugation: Principle, Types of centrifugations, Analytical and Ultra centrifugation, Rotors and its types, Application of centrifugation	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
2	Microscopy: history, principles and types. Bright field, dark field, phase contrast, fluorescent microscopy, Phase contrast microscopy , Electron Microscopy: scanning and transmission electron microscopy	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
3	Chromatography: Principle, working, and applications of Paper chromatography, thin layer chromatography, gel filtration chromatography, ion exchange chromatography, and affinity chromatography. HPLC	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
4	Spectrum and their Types, wave length range of electromagnetic radiation. Spectroscopy: basic principle, principles and applications of colorimetry and visible spectroscopy, Principles and applications of Infrared and U.V. spectroscopy, Atomic absorption spectroscopy (AAS): principle and application. Principle and applications of NMR and ESR	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
5	Electrophoresis: principles, types and applications , Zonal electrophoresis: paper, PAGE, agarose gel electrophoresis	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8

	Radioactivity: principle of radioactive decay, half life, unit of measurement.Radioisotopes: applications in biological sciences, Scintillation counters: basic principle and types. Flow cytometer.		

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation of broth and liquid culture media to grow the test bacterial culture.	Experiments	BL2-Understand	2

Part D(Marks Distribution)

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

Part E

Books	Nelson, Cox and Leininger Biochemistry 8th Edition
Articles	https://pubs.acs.org/doi/full/10.1021/acs.jchemed.0c00404
References Books	Stryer Biochemistry 9th Edition
MOOC Courses	https://nptel.ac.in/courses/102108082
Videos	https://nptel.ac.in/courses/102108082

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_Biotechnology)

Title of the Course	General Microbiology
Course Code	BSBT 103 (T)

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	the basic concepts and view of professional and scientific communication approaches for microbiology settings			Co-Requisite/s	comprehensive understanding of sterilization processes and media preparation pipelines			
Course Outcomes & Bloom's Level	**CO1-** To identify the basic concepts and view of professional and scientific communication approaches for microbiology settings **(BL1-Remember)** **CO2-** To understand the gene transfer mechanisms and a detailed insight into mutations and their analysis **(BL2-Understand)** **CO3-** To describe comprehensive understanding of sterilization processes and media preparation pipelines **(BL3-Apply)** **CO4-** To provide experimental basis, and to enable students to analyse the basic concepts of microbial evolution, phylogeny, nutritional aspects, and elements of microbial genetics**(BL4-Analyze)** **CO5-** To apply Appraise the current regulatory, quality control, and legal frameworksthat impact biotechnology and ethical behaviours that foster positive and productive interactions in diverse microbiology and biotechnology settings.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕			SDG (Goals)	SDG4(Quality education)			

Part B

Modules	Contents	Pedagogy	Hours
1	History of Microbiology, Contributions of Antony Von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister Alexander Fleming, Role of Microorganisms in Fermentation, Germ Theory of Disease, Development of Various Microbiological Techniques and Golden Era of Microbiology.	Tutorials, Collaborative, Demonstrations, Project methods Experiments	8
2	Binomial Nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utilit. Difference between prokaryotic and eukaryotic microorganisms. General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
3	Pure culture isolation: Streaking, serial dilution and plating methods; cultivation, maintenance and preservation/stocking of pure cultures; cultivation of anaerobic bacteria, and accessing non- culturable bacteria. Enrichment culture technique, Detection of specific microorganisms - on XLD agar, Salmonella Shigella Agar, Manitol salt agar, EMB agar, McConkey Agar, Saboraud Agar. Microbial growth- mathematical expression of growth, growth curve, Factor affecting growth.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	9

4	**Structure and diversity of Bacteria & Viruses. Microbes** in Extreme Environments. Nutritional requirements of microbes. Bacteriology:- Morphology and ultra-structure of bacteria, morphological types , Archaebacteria Structure and Function of cell organelles	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
5	Fundamentals of Microbial Control Principle and Types, Sterilization, Disinfectant, Antiseptic, Sanitizer, Germicidal and Bactericides. Characteristics, Evaluation and Selection of Ideal antimicrobial agent. Physical Agents of Microbial Control :- High Temperature, Low temperature, Desiccation, Osmotic Pressure, Radiation, Ultraviolet lights, X- rays, Gamma rays, Cathode rays, surface tension and interfacial tension, filtration. Chemical Agents of Microbial Control:- Phenol and phenolic compound, Alcohol, Halogen, Heavy metals and their compounds, Dyes, Detergents, Quaternary ammonium compounds, Aldehydes, Gaseous sterilization. Biological Agents ,Microbial Control :- (Antibiotics) Types, Mode of Action	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Preparation of broth and liquid culture media to grow the test bacterial culture.	Experiments	BL2-Understand	2
X	To isolate bacteria flora from the different location of the university campus.	PBL	BL5-Evaluate	7 days
III	Perform the simple staining of the given test organisms to observe their shape.	Experiments	BL2-Understand	2
IV	Perform the negative staining of the given test organisms to observe their shape.	Experiments	BL2-Understand	2
V	Perform the Gram's staining of the given test organism	Experiments	BL2-Understand	2
VI	Perform the Endospore staining of the given test organisms.	Experiments	BL3-Apply	2
VII	Check the effect of UV radiation on the growth of microorganisms.	Experiments	BL3-Apply	2

VIII	Demonstrate the acid and gas production by the organisms.	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

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

Part E

Books	Nancy Trun and Janine Trempy-Fundamental Bacterial Genetics-1st Edition
Articles	https://bmcmicrobiol.biomedcentral.com/articles
References Books	U.N. Streips and R.E. Yasbin-Modern Microbial Genetics-2nd Edition
MOOC Courses	https://nptel.ac.in/courses/102105087 https:el.ac.in/courses/102103015//n
Videos	https://nptel.ac.in/courses/102105087 https:el.ac.in/courses/102103015//npt

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_Biotechnology)

Title of the Course	Plant Diversity
Course Code	BSBT 106 (T)

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have basic knowledge of general characteristics, classification, cell structure, nutrition, reproduction and economic importance of bacteria, fungi, algae,bryophytes and pteridophytes etc			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the structure of various microorganisms like bacteria, fungi, protozoa, etc**(BL1-Remember)** **CO2-** To understand the evolution of sporophytes and will be able to make dendrogram- the evolutionary tree. **(BL2-Understand)** **CO3-** To understand the general characteristics, classification, cell structure, nutrition, reproduction and economic importance of bacteria, fungi, algae.**(BL2-Understand)** **CO4-** To provide experimental basis, and to enable students to analyse the structure of a typical flower, pollination, double fertilization, fruit and seed formation. **(BL3-Apply)** **CO5-** To apply the understanding of the gymnosperm's distribution and features in India.**(BL3-Apply)** **CO6-** To evaluate the applications of bryophytes and pteridophytes in various fields such as research and medical**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
I	Discovery, physicochemical and biological characteristics; classification, replication: Symptoms, transmission and management of viral diseases in plants. Bacteria: - General characteristics, Cell structure, nutrition, reproduction and economic importance of bacteria. Classification of Organisms: The Five Kingdoms; Characteristics of Plants; Environmental Degradation and Plant Diversity	lecture method, group discussion, Field visits, ABL, PBL	8
II	Algae: General Characteristics, classification and economic Importance. Thallus structure, reproduction and life cycles. Fungi: General characteristics, classification and economic importance. Thallus structure, reproduction and life cycle. General Account of Lichen.	lecture method, group discussion, Field visits, ABL, PBL	8
III	Bryophyta: General characteristics; and classification. Pteridophyta: Characteristic features, classification. Stelar organization, Evolution of seed habit	lecture method, group discussion, Field visits, ABL, PBL	8
IV	Gymnospems: Characteristic features and classification Evolution of gymnosperms. Geological time scale and origin of gymnosperms	lecture method, group discussion, Field visits, ABL, PBL	9

V	Angiosperms: Origin and evolution, Taxonomy & classifications(Bentham and Hooker, Engler and Prantl and Hutchinson classification). Phylogeny of angiosperms. Vascular organization of dicots andmonocots, secondary growth, growth rings, sap wood and heart wood, cork. Structure of a typical flower, pollination, double fertilization, fruit and seed formation.	lecture method, group discussion, Field visits, ABL, PBL	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Study of the vegetative and reproductive structures in Volvox, Oedogonium, Vaucheria, Ectocarpus, Polysiphonia, Nostoc through, EM, temporary preparations and permanent slides	Experiments	BL2-Understand	2
II	Study of thallus and reproductive, structures in Phytophthora, Mucor, Aspergillus, Puccinia, Alternaria	Experiments	BL2-Understand	2
III	Study of bacterial infected plants and root nodules	Experiments	BL4-Analyze	2
IV	Anatomy of dicot root, stem, leaf	Experiments	BL2-Understand	2
V	Anatomy of monocot stem, root & leaf	PBL	BL2-Understand	2
VI	Secondary growth of stem of Bignonia	PBL	BL2-Understand	2
VII	Morphology, anatomy and reproductive structures of Riccia, Marchantia, Anthoceros and Polytrichum through temporary preparations and permanent slide	Experiments	BL2-Understand	2

VIII	To understand the flora and fauna of hilly areas	Field work	BL2-Understand	1week

Part D(Marks Distribution)

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

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

Part E

Books	Alexopoulos, C. J. and C. W. Mims.Introduction to Mycology
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6112092/
References Books	Mehrotra, R. S. and K. R. Aneja.,An introduction to Mycology,2nd Edition Bold, H.C. and Wayne, M.J.,Introduction to Algae,3rd Edition Cronquist, A.,An Integrated System of Classification of Flowering Plants Esau, K,Anatomy of Seed Plants.
MOOC Courses	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6112092/
Videos	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6112092/

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DEPARTMENT OF FOOD TECHNOLOGY

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Department of Food Technology

Dated: 20/09/2019

Minutes of Meeting (BOS)

Meeting of Board of Studies in Department of Food Technology, School of Sciences of ITM University Gwalior held on 20/09/2019 using an online mode. The following members were present:

S.No	Name of Faculty	Designation	Signature
1.	Dr. Richa Kothari	Chairman (Dean)	
2.	Dr. Sonia Johri	Dean Academics	
3.	Dr. Mithilesh Jaiswal	External Expert Scientist, (Biotech) – Health and Nutrition Division, Tropilite Foods Pvt Ltd., Gwalior,	
4.	Dr. Hradesh Rajput	Member (Coordinator)	
5.	Dr. Ankit Dayal	Member	

The following decisions* were taken in the meeting

1. Syllabus of first year B.Sc Food Technology (Hons.) with minor corrections has been approved.

2. Scheme of first year examination B.Sc Food Technology has been approved.
3. Syllabus of first year M.Sc. Food Technology with minor corrections has been approved.
4. Scheme of first year examination M.Sc. Food Technology has been approved.
5. "Scheme and Syllabus of the following new courses are approved: "as attached in Annexure I

   1. Unit Operations- BSFT-302
   2. Processing of cereals, pulses, oilseeds and sugar crops- BSFT-303
   3. Computer Applications- BSFT-305
   4. Technology of Bakery & confectionery- BSFT-402

5. Chemistry- BSFT 102
6. Introduction To Food Technology- BSFT-101[
7. General Microbiology- BSFT-103
8. English Communication- BSFT-104
9. Introduction to Biology- BSFT-105 b
10. Technology of Food Preservation- BSFT-201
11. Tools and Techniques- BSFT-202
12. Food Microbiology -BSFT-203
13. Basics of food biochemistry- BSFT-204
14. Food and Nutrition- BSFT-205
15. Hindi- BSFT-206
16. Food Chemistry-BSFT-301
17. Food Additives- BSFT-304
18. Processing of Fruits and Vegetables Technology- BSFT-401
19. Technology of flesh foods- BSFT-403
20. Dairy Technology- BSFT-404
21. Disaster Management- BSFT-405
22. English-II- BSFT-406
23. Sensory Evaluation- BSFT-501
24. Post Harvest Technology- BSFT-502
25. Food Hygiene and Food Sanitation -BSFT-503
26. Food Quality Management- BSFT-504
27. Food Packaging- BSFT-505
28. Product Development and Formulation- BSFT-601
29. Food Industries by-Products and Waste Management- BSFT-602
30. Entrepreneurship &Supply Chain Management- BSFT-603
31. Major Project & Seminar- BSFT-604
32. Fruits and Vegetables Technology- FT-201
33. Principles of Food Processing-FT-101
34. Fundamentals of Food Chemistry- FT-102
35. Food and Nutrition- FT-103
36. Product Development, Food Laws and Quality Control- FT-104
37. Sensory Evaluation and By-product Utilization- FT-105
38. lab Course-I- FT-106
39. Lab course-II- FT-107
40. Food Microbiology-FT-202
41. Tools and Techniques- FT-203
42. Food Engineering- FT-204
43. Food Packaging Technology- FT-205
44. Lab course-III [P]- FT-206
45. Lab course- IV [P]-FT-207 [P]
46. Processing of Cereals, Pulses, Oilseed & Sugar Crops-FT-301
47. Processing of Milk and Milk Products-FT-302
48. Processing of Meat, Fish and Poultry Products-FT-303
49. Food Additives-FT-304
50. Research Methodology- FT-305
51. Research Report and Presentation- FT-402 [P]

Annexure I

Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Unit Operations [T]
Course Code	BSFT-302 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Basic concepts of Physics, Chemistry & Mathematics			**Co-Requisite/s**	To be familiar with the basic concepts of technology of processing of fruits and vegetables			
Course Outcomes & Bloom's Level	**CO1-** The subject Unit Operations is designed for under graduate students of food technology for understanding of basic concepts of each and every division of the subject along with its applications in other fields. **(BL1-Remember)** **CO2-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge on different techniques **(BL2-Understand)** **CO3-** The course aims to provide basis of analyzing the applications of Unit Operations in various fields of research and industries. **(BL3-Apply)** **CO4-** The course aims to provide basis of design, production, transfer of mass and heat produced through research and in industries. **(BL4-Analyze)** **CO5-** To apply the tools in identifying the problems and providing solutions to them. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	FluidMechanics:DimensionalAnalysis.BasicequationsofFluidFlow,HagenPonselle equation,BernoulliEquation,FluidFriction.Flowthroughpipesandopenchannels,Orifi ceandVenturimeters,PitotTube,Weirs,Rotametersandothertypesofmeters,Transporta tionoffluids,PipeFittingsandvalves,Pumps–classification,centrifugalandpositivedisplacementtype– peristaltic. Blowers and Compressors (oil-free).	Lecture method, seminar, quiz	8
2	MechanicalOperations:Principles of comminution, Types of comminuting equipment. Crushers, Grinders, Mixing and Agitations Power consumption in mixing,Mechanicalseparation,Screening,Typesofscreen,Filtration,Principle of Constant pressure and constantrate filtration, Settling classifiers, Floatation.	Lecture method, seminar	8

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Processing of cereals, pulses, oilseeds and sugar crops [T]
Course Code	BSFT-303 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studied introduction to food technology and food chemistry in previous semester		**Co-Requisite/s**	Students should have basic knowledge of plat parts and morphology, various preservation and processing techniques.				
Course Outcomes & Bloom's Level	**CO1-** To remember the cereals composition and milling process and technological methods used to increase cereal grains, pulses and oil-seeds quality**(BL1-Remember)** **CO2-** To understand the core principles, and properties of interaction of various flour components and their role in end use quality**(BL2-Understand)** **CO3-** To provide the students an experimental basis and specialized knowledge and understanding in the field of cereals processing**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as interaction,and interpretation of cereals, pulses and oil-seeds utilization.**(BL4-Analyze)** **CO5-** To evaluate the practical knowledge on cereals and oilseeds and implement the same to create processed and value added food products.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction Wheat Types, milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, Products and Byproducts Rice Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of by products.	Lecture, discussion and PPT	11
2	Corn Milling (wet & dry) , cornflakes, corn flour, Barley Milling(pearl barley, barley flakes & flour) Oats Milling (oat meal, oat flour & oat flakes)	Lecture, discussion and PPT, Interactive videos	11
3	Sorghum and millets Traditional & commercial milling (dry &wet) Rye and triticale milling (flour), uses and by products.	Lecture, discussion and PPT	10
4	TECHNOLOGY OF PULSES Milling of pulses, Dry milling, Wet milling, Improved milling method	Lecture methods,Audio/Video clips, group discussion, quiz	08
5	TECHNOLOGY OF OILSEEDS Introduction, Extraction of oil and refining, Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fibre spinning. Sugar processing and refining.	Lecture methods,Audio/Video clips, group discussion, quiz	10

Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	40	20	60	0

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Computer Applications [T]
Course Code	BSFT-305 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Specialization Elective Courses							
Pre-Requisite/s	Student must have studied computer science in 10+2			**Co-Requisite/s**	Knowledge of MS Word, Powerpoint and Excel			
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the basic concepts of Computer Applications, its applications and future prospects. **(BL1-Remember)** **CO2-** The subject Computer Applications is designed for under graduate students of biotechnology for understanding of basic concepts of each and every division of the subject along with its applications in other fields.**(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding.**(BL3-Apply)** **CO4-** The course aims to provide basis of analyzing the applications of Fundamentals of Biostatistics and Computer Applications in various fields of research and industries.**(BL4-Analyze)** **CO5-** The course aims to provide basis of experimental design, computer applications and use of statistical tools in research and industries.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

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

Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	12	60	0

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Technology of Bakery & confectionery [T]
Course Code	BSFT-402 [T]

Part A

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

Part B

Modules	Contents	Pedagogy	Hours
1	Bakery industry; Current status, growth rate, and economic importance of Bakery Industry in India. Major bakery industries in India Role of Raw Materials Required for Bakery & Confectionery: Wheat flour, sugar, fat, eggs, Essential ingredients: flour, sugar, shortening, eggs, Optional ingredients: baking powder, milk, milk products, dry fruits, baking soda, dairy products, yeast etc used in bakery and confectionery. Role of yeast in bakery industry.	Lecture method, industrial visit	7
2	Introduction to Confectionery: Scope of confectionery, Confectionery terms, Small and large equipment Role of Raw Material Required for Confectionery: Wheat, flour, sugar, fat, eggs., Essential ingredients: flour, sugar, shortening, eggs, Optional ingredients: baking powder, milk, milk products, dry fruits, baking soda, dairy products, etc used in bakery and confectionery.	Lecture method, Quiz, Illustrate with analogies.	8
3	CAKES Ingredients & processes for cakes, Equipments used , product quality characteristics, faults and corrective measures. Different types of icings.).Cake Making Methods: Sugar batter method, Flour batter method , Genoese. Blending	Audion-video clips, Expert Lecture	10
4	Moistening Agents: Milk, Egg, Water. Fats and Oil:Composition, functions in confectionery, types of fats and oil, storage. Leavening Agents:Chemical, natural, water vapors and biological BISCUITS, COOKIES & CRACKERS Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures. Production and quality of breakfast cereals, macaroni products and malt.	Lecture method, Audio/Video clips, group discussion, quiz	12
5	MODIFIED BAKERY PRODUCTS Modification of bakery products for people with special nutritional requirements e.g. high fiber, low sugar, low fat, gluten free bakery products	Lecture methods,Audio/Video clips, group discussion, quiz	8

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Chemistry
Course Code	BSFT 102[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have the basic knowledge of Physical ,Inorganic and Organic chemistry			**Co-Requisite/s**	Students should know the chemistry and functions of Biomolecules			
Course Outcomes & Bloom's Level	**CO1-** To remember the basics of modern biochemistry and molecular biophysics, including the principles of biological phenomena, and structural, functional and dynamic aspects of biological components**(BL1-Remember)** **CO2-** To understand the core principles and topics of chemistry, structural and chemical biology including nucleic acid structure and interactions, signaling proteins and membrane proteins, enzyme kinetics and drug discovery and protein design**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge and understanding in the field of food biochemistry**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food constituents' interactions and their isolation, utilization and metabolism**(BL4-Analyze)** **CO5-** To evaluate the application of principles of biochemistry in practice to ensure healthy body metabolism.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Atomic Structure:Idea of de-Broglie matter waves, Heisenberg uncertainty principle, atomicorbitals, Schrödinger wave equation, significance of Y and Y2, quantumnumbers, radial and angular wave functions and probability distribution curves,shapes of s, p, d, orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, Electronic configurations of the elements, effective nuclear charge. Periodic Properties:Atomic and ionic radii, ionization energy, electron affinity and electronegativitydefinition, methods of determination or evaluation, trends in periodic table andapplications in predicting and explaining the chemical behavior	Lecture, ppt, Tutorials sessions	6
2	Chemical Bonding:(A) Covalent Bond -- Valence bond theory and its limitations, various types of hybridization anshapes of simple inorganic molecules and ions, valence shall electronpair repulsion (VSEPR) theory to NH3, H3O+, SF4, CIF3, ICl-2 and H2O,MO theory, bondstrength and bond energy Ionic Solids – Ionic structures, Born-Haber cycle, salvation energy and solubility of ionic solids, polarizing power, Fajan's rule,Metallic bond-free electron, valence bond and band theories. Weak Interactions – Hydrogen bonding, Vander Waals forces.	Quiz, lecture, Interactive videos	10
3	Stereochemistry and stereoisomerism.Conformational isomerism and analysis in acyclic and simple cyclic systems cyclohexane cyclheptane, optical isomerism - optical activity - molecular dissymmetry and chirality - elements of symmetry.	Summarizing, Quiz, Tutorials sessions, Expert Lecture	10
4	Chemistry,,of some typical natural products. A study of the following compounds involving their isolation, structure elucidation, synthesis and biogenesis - flavonoids - quercetin, cyanidin and genestein, terpenoids, α- terpeneol a α - pinene, campihor, farnesol.	Lecture methodsAudio/Video clips, group discussion, quiz	9
5	Chemistry of Noble Gasses:Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds	Lecture methods,Audio/Video clips, group discussion, quiz	10

Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction To Food Technology
Course Code	BSFT-101[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have passed class 12 or equivalent from a recognised board with Physics, Chemistry, and Biology/Home Science as compulsory subjects			**Co-Requisite/s**	Students should have basic knowledge of physics, chemistry and biology.			
Course Outcomes & Bloom's Level	**CO1-** To remember the importance of health food, ethnic food, organic food, functional food, nutraceuticals, fabricated foods, convenience foods, GM foods, space foods**(BL1-Remember)** **CO2-** To understand the food science concepts and food adulteration**(BL2-Understand)** **CO3-** To provide experimental basis and processing ideas of fruits and vegetables technology **(BL3-Apply)** **CO4-** To evaluate the applications of food laws in different food products**(BL4-Analyze)** **CO5-** To apply the understanding of food technology in developing new food products and evaluating the food quality**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Food science concept: Basic SI unit of length, volume and weight, temperature, relative density, pH. Physico-chemical properties of foodboiling point, evaporation, melting point, smoke point, surface tension, osmosis, humidity, freezing point and specific gravity.	Lecture method, audio/video clips, group discussion, quiz, industrial visit	9
2	Colloidal systems in foods: Constituents of food, true solution, suspension, stability of colloidal system, types of colloidal system in food-sol, gel, emulsion, foam Classification of food: Health food, ethnic food, organic food, functional food, nutraceuticals, fabricated foods, convenience foods, GM foods, space foods, Probiotics and prebiotics	Lecture method, audio/video clips, group discussion	9
3	Food additives: Food additives, antioxidants, sequestrants, preservatives, nutrient supplement, emulsifiers, stabilizers and thickening agents, bleaching and maturing agent, sweeteners, humectants and anti caking agents coloring and flavoring substance Food adulteration: Types of adulterants- intentional and incidental adulterants, methods of detection. Browning Reaction: Introduction, types, role of browning in food	lecture method, audio/video clips, group discussion, lecture with ppt	10
4	Fruits and Vegetables: Classification, general composition, names and sources of pigments, Dietary fiber. Post harvest changes in fruits and vegetables, physical changes, chemical changes during the storage of fruits and vegetables. measures to reduce post-harvest losses	Lecture methods,audio/video clips, group discussion, quiz	12
5	Food safety and quality assurance- definition, Evaluation of foodsubjective and objective, Food standards - PFA, BIS, AGMARK, FPO, ISI, FSSAI	Lecture methods,Industrial visit, audio/video clips, group discussion, quiz	10

Part C

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

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Technology of Bakery & confectionery [T]
Course Code	BSFT-402 [T]

Part A

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

Part B

Modules	Contents	Pedagogy	Hours
1	Bakery industry; Current status, growth rate, and economic importance of Bakery Industry in India. Major bakery industries in India Role of Raw Materials Required for Bakery & Confectionery: Wheat flour, sugar, fat, eggs, Essential ingredients: flour, sugar, shortening, eggs, Optional ingredients: baking powder, milk, milk products, dry fruits, baking soda, dairy products, yeast etc used in bakery and confectionery. Role of yeast in bakery industry.	Lecture method, industrial visit	7
2	Introduction to Confectionery: Scope of confectionery, Confectionery terms, Small and large equipment Role of Raw Material Required for Confectionery: Wheat, flour, sugar, fat, eggs., Essential ingredients: flour, sugar, shortening, eggs, Optional ingredients: baking powder, milk, milk products, dry fruits, baking soda, dairy products, etc used in bakery and confectionery.	Lecture method, Quiz, Illustrate with analogies.	8
3	CAKES Ingredients & processes for cakes, Equipments used , product quality characteristics, faults and corrective measures. Different types of icings.).Cake Making Methods: Sugar batter method, Flour batter method , Genoese. Blending	Audion-video clips, Expert Lecture	10
4	Moistening Agents: Milk, Egg, Water. Fats and Oil:Composition, functions in confectionery, types of fats and oil, storage. Leavening Agents:Chemical, natural, water vapors and biological BISCUITS, COOKIES & CRACKERS Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures. Production and quality of breakfast cereals, macaroni products and malt.	Lecture method, Audio/Video clips, group discussion, quiz	12
5	MODIFIED BAKERY PRODUCTS Modification of bakery products for people with special nutritional requirements e.g. high fiber, low sugar, low fat, gluten free bakery products	Lecture methods,Audio/Video clips, group discussion, quiz	8

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Chemistry
Course Code	BSFT 102[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have the basic knowledge of Physical ,Inorganic and Organic chemistry			**Co-Requisite/s**	Students should know the chemistry and functions of Biomolecules			
Course Outcomes & Bloom's Level	**CO1-** To remember the basics of modern biochemistry and molecular biophysics, including the principles of biological phenomena, and structural, functional and dynamic aspects of biological components**(BL1-Remember)** **CO2-** To understand the core principles and topics of chemistry, structural and chemical biology including nucleic acid structure and interactions, signaling proteins and membrane proteins, enzyme kinetics and drug discovery and protein design**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge and understanding in the field of food biochemistry**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food constituents' interactions and their isolation, utilization and metabolism**(BL4-Analyze)** **CO5-** To evaluate the application of principles of biochemistry in practice to ensure healthy body metabolism.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Atomic Structure:Idea of de-Broglie matter waves, Heisenberg uncertainty principle, atomicorbitals, Schrödinger wave equation, significance of Y and Y2, quantumnumbers, radial and angular wave functions and probability distribution curves,shapes of s, p, d, orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, Electronic configurations of the elements, effective nuclear charge. Periodic Properties:Atomic and ionic radii, ionization energy, electron affinity and electronegativitydefinition, methods of determination or evaluation, trends in periodic table andapplications in predicting and explaining the chemical behavior	Lecture, ppt, Tutorials sessions	6
2	Chemical Bonding:(A) Covalent Bond – Valence bond theory and its limitations, various types of hybridization anshapes of simple inorganic molecules and ions, valence shall electronpair repulsion (VSEPR) theory to NH3, H3O+, SF4, CIF3, ICl-2 and H2O,MO theory, bondstrength and bond energy Ionic Solids – Ionic structures, Born-Haber cycle, salvation energy and solubility of ionic solids, polarizing power, Fajan's rule,Metallic bond-free electron, valence bond and band theories. Weak Interactions – Hydrogen bonding, Vander Waals forces.	Quiz, lecture, Interactive videos	10
3	Stereochemistry and stereoisomerism.Conformational isomerism and analysis in acyclic and simple cyclic systems cyclohexane cyclheptane, optical isomerism - optical activity - molecular dissymmetry and chirality - elements of symmetry.	Summarizing, Quiz, Tutorials sessions, Expert Lecture	10
4	Chemistry,,of some typical natural products. A study of the following compounds involving their isolation, structure elucidation, synthesis and biogenesis - flavonoids - quercetin, cyanidin and genestein, terpenoids, α- terpeneol a α - pinene, campihor, farnesol.	Lecture methodsAudio/Video clips, group discussion, quiz	9
5	Chemistry of Noble Gasses:Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds	Lecture methods,Audio/Video clips, group discussion, quiz	10

Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	General Microbiology
Course Code	BSFT-103[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studied Physics, Chemistry, and Biology/Home Science as compulsory subjects		**Co-Requisite/s**	Students should have basic knowledge of microorganisms and their classifications and structures (as studied in biology)				
Course Outcomes & Bloom's Level	**CO1-** To remember the interactions between microorganisms and the food environment, and factors influencing their growth and survival**(BL1-Remember)** **CO2-** To understand the significance and activities of microorganisms in food and characteristics of foodborne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable students to acquire a specialized knowledge and understanding in the field of food microbiology.**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food production, fermentation and how it influences the microbiological quality **(BL4-Analyze)** **CO5-** To evaluate the application of microbiological methods and microbiological analysis of food in practice to ensure proper food quality measurement.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation)					

Part B

Modules	Contents	Pedagogy	Hours
1	Scope of Microbiology: Microorganisms in human affairs and industry. History of Microbiology: Contributions of Anton van Leeuwenhoek, Joseph Lister, Paul Ehrlich, Edward Jenner, Louis Pasteur, Robert Koch and Alexander Fleming.	Lecture Method, Ice Breaking session, Review Summarizing, Tutorials sessions	10
2	Morphology of microorganisms :Classification, growth and multiplication, growth curve. Effects of environmental factors on growth of microorganism - pH, aw , redox potential, temperature, oxygen, time and nutrients present in the substrate. Characteristics - Bacteria, Fungi ,Yeasts. Role of microorganisms in food processing and product development. Beneficial effect of bacteria, fungi algae and yeasts.	Lecture Method, Quiz, Illustrate with analogies, Interactive videos	8
3	Microbiology of different foods :Sources of contamination and spoilage of: Cereal and cereal products like bread, flour and bakery products; Sugar and sugar products like honey and candies; Vegetables and fruits; Meat products like sausage ,fish, egg and poultry; Milk and its products; Canned foods. Food poisoning and food borne infection	Lecture method, Summarizing, Quiz, Tutorials sessions, Expert Lecture	10
4	Control of microorganisms :Concepts of sterilization and disinfection, methods of sterilization and disinfection. Common disinfectants used in home and at industries. Normal microbiological criteria for food consumption, testing milk and water for quality	Lecture methods,Audio/Video clips, group discussion, quiz	9
5	Food hygiene and sanitation 8 hours Importance of food hygiene and sanitation with relevance to food industry. General principles of food hygiene in rural and urban areas in relation to food preparation, processing, packaging, storage and transport and personal hygiene.	Lecture methods,Audio/Video clips, group discussion, quiz	8

Part C

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

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	English Communication
Course Code	BSFT-104 [T]

Part A

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

Part B

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

Part C

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

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction to Biology
Course Code	BSFT-105 b [T]

Part A

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

Part B

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

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Technology of Food Preservation [T]
Course Code	BSFT-201 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studies Introduction to Food Technology and Basic chemistry in previous semester		**Co-Requisite/s**	Knowledge of chemical preservatives used in different foods and processing parameters applied to extend the shelf-life of product				
Course Outcomes & Bloom's Level	**CO1-** To remember the major food preservation principles, techniques and their merits and demerits**(BL1-Remember)** **CO2-** To understand the basic concepts of thermal as well as novel food processing methods including non-thermal food processing techniques using pressure, light, sound and microwave**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable students to acquire a specialized knowledge and understanding in the field of food processing**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. developing new product, preserving fresh produce, killing microbes in food, etc.**(BL4-Analyze)** **CO5-** To evaluate the application of food preservation principles in various fields such as research and food industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

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

Part C

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Tools and Techniques [T]
Course Code	BSFT-202 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Theory only							
Course Category	Specialization Elective Courses							
Pre-Requisite/s	Should be acquainted with the basics knowledge of instruments and their uses.			**Co-Requisite/s**	Knowledge of food analysis and food adulteration			
Course Outcomes & Bloom's Level	**CO1-** Demonstrate an understanding of physics and engineering in biosensor, electrodes**(BL1-Remember)** **CO2-** Demonstrate an understanding of the biomedical instrumentation principles in aspects of device design and applications**(BL2-Understand)** **CO3-** Apply these principles in the context of bioinstrumentation interactions with tissues, organs and human body to explain the measurement results and to develop the instrumentation**(BL3-Apply)** **CO4-** Students will demonstrate these abilities and hone the appropriate information gathering, computational and data-handling skills in homework and lab exercises.**(BL4-Analyze)** **CO5-** They will demonstrate their proficiency formally in examinations**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**					

Part B

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	12	60	0

Part E

Books	Khader, V. (2004) Text book on Food Storage and preservation. Ludhiana: Kalyani Publishers.
Articles	
References Books	DESROSIER, N.W. (2018) Technology of Food Preservation. ED-TECH. Fennema, O.R. (1976) Principles of Food Science. New York: Dekker.
MOOC Courses	https://nptel.ac.in/courses/127105231
Videos	https://www.youtube.com/watch?v=vznRdbIDl5w&t=1s

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Microbiology [T]
Course Code	BSFT-203 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studied Physics, Chemistry, and Biology/Home Science as compulsory subjects		**Co-Requisite/s**	Students should have basic knowledge of microorganisms and their classifications and structures (as studied in biology)				
Course Outcomes & Bloom's Level	**CO1-** To remember the interactions between microorganisms and the food environment, and factors influencing their growth and survival**(BL1-Remember)** **CO2-** To understand the significance and activities of microorganisms in food and characteristics of foodborne waterborne and spoilage microorganisms, and methods for their isolation, detection and identification**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable students to acquire a specialized knowledge and understanding in the field of food microbiology.**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food production, fermentation and how it influences the microbiological quality **(BL4-Analyze)** **CO5-** To evaluate the application of microbiological methods and microbiological analysis of food in practice to ensure proper food quality measurement.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to microbiology: Microbiology in daily life, Characteristics and morphology of bacteria, fungi, virus, protozoa and algae. Control of micro-organisms- Growth curve; Influence of environmental factors on growth- PH, Water activity, O2 availability, Temperature, Pressure and Radiation.	Lecture Method, Ice Breaking session, Review Summarizing, Tutorials sessions	10
2	Cultures and Media: Different type of media- Selective media and differential media; Preparation of media- PDA media, Nutrient agar, Mac-Conkey agar; Culturing techniques- Spread plate and streak plate, pour plate.	Lecture Method, Quiz, Illustrate with analogies, Interactive videos	8
3	Contamination and spoilage of different foods: Cereals, sugar and their products, Milk and milk products, Fruits and vegetables, canned foods, Meat, fish, egg and poultry.	Lecture method, Summarizing, Quiz, Tutorials sessions, Expert Lecture	10
4	Food borne illness: Food intoxication- Staphylococcal intoxication, botulismFood infection- Salmonellosis, Clostridium perfringens, Bacillus cereus gastroenteritis, E.coli infection and others.	Lecture methods, Audio/Video clips, group discussion, quiz	9
5	SCP- Microorganisms used, raw materials used as substrate, condition for growth and production, nutritive value and use of SCP; Fat from microorganisms- Microorganisms used raw materials, production of fat; Production of amino acids; Production or other substances added to foods. Production of enzymes- amylases, invertase, pectolytic enzymes, proteolytic enzymes, other enzymes	Lecture methods, Audio/Video clips, group discussion, quiz	8

Part C

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

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Basics of food biochemistry [T]
Course Code	BSFT-204 [T]

Part A

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

Part B

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

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Part D(Marks Distribution)

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

Part E

Books	Osgood, M., Ocorr, K.A. and Lehninger, A.L. (2000) The absolute, ultimate guide to lehninger's principles of Biochemistry, third edition: Study guide and solutions manual. New York: Worth Publishers.
Articles	
References Books	Harpers Illustrated Biochemistry (2015). Erscheinungsort nicht ermittelbar: McGraw-Hill Professional. Campbell, M.K. and Farrell, S.O. (2012) Biochemistry. Pacific Grove, CA: Brooks/Cole.
MOOC Courses	https://nptel.ac.in/courses/102106087
Videos	https://youtu.be/82yp3h2IzIQ?si=Z-aPUfssHzemE-EO

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food and Nutrition
Course Code	BSFT-205 [T]

Part A

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

Part B

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

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Chemistry
Course Code	BSFT-301 [T]

Part A -

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have the basic knowledge of Physical ,Inorganic and Organic chemistry			**Co-Requisite/s**	Students should know the chemistry and functions of Biomolecules			
Course Outcomes & Bloom's Level	**CO1-** To remember the basics of modern biochemistry and molecular biophysics, including the principles of biological phenomena, and structural, functional and dynamic aspects of biological components**(BL1-Remember)** **CO2-** To understand the core principles and topics of chemistry, structural and chemical biology including nucleic acid structure and interactions, signaling proteins and membrane proteins, enzyme kinetics and drug discovery and protein design**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge and understanding in the field of food biochemistry**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food constituents' interactions and their isolation, utilization and metabolism**(BL4-Analyze)** **CO5-** To evaluate the application of principles of biochemistry in practice to ensure healthy body metabolism.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Hindi [T]
Course Code	BSFT-206 [T]

Part A

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

Part B

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

Part D(Marks Distribution)

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

Part E

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

Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Additives
Course Code	BSFT-304 [T]

Part A

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

Part B

Modules	Contents	Pedagogy	Hours
1	Definitions, classification and functions, need for food additives, food preservatives, classifications, antimicrobial agents (types, mode of action and their application),safety concerns, regulatory issues in India, International legal issues Nutrient supplements & thickeners, polysaccharides, bulking agents, antifoaming agents, synergists ,antagonists	Lecture method, quiz, seminar	8
2	Antioxidants (synthetic and natural, mechanism of oxidation inhibition),chelating agents: types, uses and mode of action, Coloring agents: color retention agents, applications and levels of use, natural colorants, sources of natural color (plant, microbial, animal and insects), misbranded colors, color extraction techniques, color stabilization	Lecture method, quiz, seminar, quiz	12
3	Flavoring agents: flavors (natural and synthetic flavors), flavor enhancers, flavor stabilization, flavor encapsulation Flour improvers: leavening agents, humectants and sequesterants, hydrocolloids, acidulants, pH control agents buffering salts, anticaking agents, etc.	Summarizing, Quiz, Whiteboard, Expert Lecture	7
4	Sweeteners: natural and artificial sweeteners, nutritive and nonnutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products	Lecture method, group discussion, industrial visit	8
5	Emulsifiers: Types, selection of emulsifiers, emulsion stability, functions and mechanism of action. Additives, food uses and functions in formulations; permitted dosages	Group discussion, lecture, ppt	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal E**
100	50	40	12	60	0

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Processing of Fruits and Vegetables Technology
Course Code	BSFT-401 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have studies Post-Harvest technology and food preservation in previous semesters			**Co-Requisite/s**	Study of nutritional composition of fruits and vegetables and preparation of value added products			
Course Outcomes & Bloom's Level	**CO1-** To remember the specific processing technologies used for vegetable, fruits and products derived from these materials **(BL1-Remember)** **CO2-** To understand the application of scientific principles in the processing technologies, product specification and regulations **(BL2-Understand)** **CO3-** To provide students an experimental basis and a specialized knowledge and understanding in the changes in the composition of the raw material with respect to the type of processing technology used **(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in fruits/vegetables processing and new product development from them **(BL4-Analyze)** **CO5-** To evaluate the real life knowledge gained in fruits and vegetables composition and properties and implement the same to create processed and value added food products. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Technology of Fruits and Vegetables: Introduction, Importance of fruits and vegetable, need of preservation. Reasons of spoilage. Canning and bottling of fruits and vegetables: Selection of fruits and vegetables, process of canning, factors affecting the process- time and temperature, containers of packing, lacquering, syrups and brines for canning, spoilage in canned foods.	Lecture method, quiz, group discussion	9
2	Fruits beverages: Introduction, Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification), preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation), processing of squashes, cordials, nectars, concentrates and powder.	Lecture method, Quiz, Illustrate with analogies	9
3	Jams, jellies and marmalades: Introduction, Jam: Constituents, selection of fruits, processing and technology, Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing and technology, defects in jelly, Marmalade: Types, processing and technology, defects. Pickles, chutneys and sauces: Processing, Types, Causes of spoilage in pickling.	Lecture method, industrial visit, Expert Lecture	9
4	Tomato products: Selection of tomatoes, pulping and processing of tomato juice, tomato puree, paste, ketchup, sauce and soup. Dehydration of foods and vegetables: Sun drying and mechanical dehydration, process variation for fruits and vegetables, packing and storage	Lecture method, group discussion, audio-video clips, quiz	9
5	Spices: Processing and properties of major and minor spices, Essential oils and oleoresins, adulteration Tea-Coffee and Cocoa: Processing, variety and products.	Lecture method, Audio/Video clips, group discussion, quiz	9

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Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Technology of flesh foods [T]
Course Code	BSFT-403 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studied food processing and preservation, food nutrition and related subjects in previous semester		**Co-Requisite/s**	Students should have prior basic knowledge of preservation, processing etc.				
Course Outcomes & Bloom's Level	**CO1-** To remember the raw material characteristics, handling, processing, and preservation**(BL1-Remember)** **CO2-** To understand the scientific principles in the processing technologies, by-product utilization of meat, poultry, fish and egg products**(BL2-Understand)** **CO3-** To provide students an experimental basis and a specialized knowledge and understanding in the development and quality control of meat, poultry and fish products and maintaining hygiene, sanitation and mechanized practices of meat, fish, poultry and egg industry**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in research and development in meat, poultry and fish products**(BL4-Analyze)** **CO5-** To evaluate the real life knowledge gained and properties and implement the same to create new flesh products. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Livestock and poultry population in India, Development of meat and poultry industry in India and its need in nation's economy. Meat quality: Effects of feed, breed and environment on production of meat animals and their quality, Meat Quality-color, flavor, texture, WaterHolding Capacity(WHC),Emulsification capacity of meat	Lecture method, quiz, group discussion	7
2	Slaughter process Slaughter, inspection and grading, Antemortem examination of meat animals, slaughter of buffalo, sheep/ goat, poultry, pig dressing of carcasses, post-mortem examination of meat. Preservation of meat: Refrigeration and freezing, thermal processing-canning of meat, retort pouch, dehydration, irradiation, and RTE meat products, meat curies, Sausages processing, types and defects. By-products: Importance, classification and uses, Manufacture of Natural casings.	Lecture method, Quiz, Illustrate with analogies, industrial visit	10
3	Egg Industry and Egg Production Practices: The egg industry, its techniques of working, General management, structure, composition and nutritive value of egg and its products.	Lecture method, Expert Lecture, quiz	10
4	Preservation of eggs: Refrigeration and freezing, thermal processing, dehydration, coating. Quality identification of shell eggs: Factors affecting egg quality and measures of egg quality.	Audio/Video clips, group discussion, lecture with ppt, quiz	9
5	Status of fishery industry in India. Fish Curing and Smoking Canning of fish Fishery by-products Fermented fish Concept of other Sea foods. Effect of processing on nutritive value of fish and fish products.	Group discussion, lecture with ppt, quiz	9

M

Part C

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

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Dairy Technology
Course Code	BSFT-404 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	candidates must have passed class 12 or equivalent from a recognised board with Physics, Chemistry, and Biology/Home Science as compulsory subjects and an overall grade of at least 50%			**Co-Requisite/s**	The student should have a basic knowledge of milk.			
Course Outcomes & Bloom's Level	**CO1-** To remember the milk characteristics, handling, processes related to storage, processing and distribution of milk and milk Products **(BL1-Remember)** **CO2-** To understand thescientific principles in the thermal processing technologies, and production of different dairy products**(BL2-Understand)** **CO3-** To provide students an experimental basis and a specialized knowledge and understanding in the development and quality control of milk and dairy products**(BL3-Apply)** **CO4-** Toapply the subject knowledge in future perspectives i.e. such as in research and development in dairy products**(BL4-Analyze)** **CO5-** Toevaluate the real life knowledge gained and properties and implement the same to create new dairy products. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consuption and production)				

Part B

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

Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

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

Course Articulation Matrix

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

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Disaster Management (Theory)
Course Code	BSFT-405 [T]

Part A

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

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Disasters: Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience,	Lecture methods,Audio/Video clips, group discussion, quiz	8
2	Disasters: Classification, Causes, Impacts (including social, economic, political, environmental, heath, psychosocial, etc.) Differential impacts-in terms of caste, class, gender, age, location, disability. Global trends in disasters urban disasters, pandemics, complex emergencies, Climate change.	Lecture methods,Audio/Video clips, group discussion, Review Analysis	8
3	Approaches to Disaster Risk reduction: Disaster cycle-its analysis, Phases, Culture of safety, prevention, mitigation and preparedness, Roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states,	Lecture methods, Audio/Video clips, group discussion, classroom presentations	8
4	Inter-relationship between Disasters and Development: Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.	Lecture methods, Audio/Video clips, group discussion, quiz	8
5	Disaster Risk Management in India: Hazard and Vulnerability profile of India. Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Mitigation, Response and Preparedness, DM Act and Policy	Lecture methods, Audio/Video clips, group discussion, Case Based Assignments, Quiz, Application Based Activity	8

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	English-II
Course Code	BSFT-406 [T]

Part A

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

Part B

Modules	Contents	Pedagogy	Hours
1	Communication: Definition, Process, Types, Basics of Reading, Writing, Speaking and Listening.	Lecture method	7
2	Speech: Body language, Eye-contact, Posture, Intonation, Pronunciation (Use of Transcription dictionary). Writing: 7 C Concept of writing effectively [Clarity, Correctness, Completeness, Conciseness, Candidness, Consideration, Courtesy], Difference between speech and writing.	PPT, Audio Video Mode	9
3	Research Writing: Selection of a topic, thesis statement, developing hypothesis and thesis, Sources of data collection. Introductory, Developmental, Transitional and Concluding paragraphs	Mind Maps	8
4	Technical Writing: Reports, handbooks, manual, letters, memorandum, notices, agenda, questionnaire, minutes, posters, bulletins, note making	Lecture method, Audio Video Mode	8
5	Common Errors: Barriers to Communications: - semantic barriers, attitudes, mental alertness. Punctuation, title and sub-title writing, content writing, notes, appendix, references, bibliographyTo enable students to participate independently in conversations and discussions conducted in English.	Audio Video Mode	8

Part D(Marks Distribution)

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

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Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Sensory Evaluation [T]
Course Code	BSFT-501 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have studied food additives and food chemistry			**Co-Requisite/s**	Students should have basic knowledge of characterstics/ attributes of different food products			
Course Outcomes & Bloom's Level	**CO1-** CO1: Illustrate the ability to identify solutions to problems related to the sensory analysis of food and to apply and expand upon the theoretical concepts presented in lectures.**(BL1-Remember)** **CO2-** CO2: Compiles, familiarity and competence with the practical skills and techniques used to analysesthe sensory properties of food. This will include experimental planning, the preparation of suitable samples and the use of instruments e.g., viscometers and color meters, as well as the collection of experimental data and its presentation, statistical analysis and interpretation.**(BL2-Understand)** **CO3-** CO3: State terminology, appropriate to the field of sensory analysis, correctly and contextually.**(BL3-Apply)** **CO4-** CO4: Ability to explain the benefits and limitations of the sensory evaluation of food and be able to recommend, justify and critique commonly used methods of sensory analysis.**(BL4-Analyze)** **CO5-** CO5: To modify foods to meet specified sensory requirements and which are intended to contribute to reducing community health concerns.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to sensory analysis, importance of sensory evaluation in food industries, general testing conditions of sensory evaluation and laboratories.	Lecture method, audio/video clips, group discussion, quiz	8
2	Selection of sensory panelist, factors affecting sensory evaluation, sensory quality parameters- size and shape, texture, flavor, aroma, color& gloss.	Lecture method, audio/video clips, group discussion, quiz	8
3	Methods of evaluation: Subjective evaluation- preference tests, acceptance tests, hedonic scale, discrimination tests, descriptive tests. Objective evaluation-physical methods & chemical methods, threshold, dilution.	Lecture method, audio/video clips, group discussion, quiz	8
4	Effect of sensory analysis on food quality & new product development, risk of consumer satisfaction & consumption.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Nutrional Quality of foods: Food proteins (Digestibility, Boilogical Value, (NPU, PER)	Audio/Video clips, group discussion, lecture with ppt, quiz	8

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Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Post Harvest Technology [T]
Course Code	BSFT-502 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have studied processing of cereals, pulses and millets in the previous semester			**Co-Requisite/s**	Students should have basic knowledge of post harvesting principles of crops			
Course Outcomes & Bloom's Level	**CO1-** CO1: Accomplish an overview on post-harvest losses and its impact on the Indian economy**(BL1-Remember)** **CO2-** CO2: Comprehend about fruit and vegetable physiology, metabolic processes and various nutritional changes in fruits and vegetables along with post-harvest handling techniques.**(BL2-Understand)** **CO3-** CO3: Generating knowledge on different pre-processing operations involved before processing of fruits and vegetables. **(BL3-Apply)** **CO4-** CO4: Interpret various post-harvest disorders and diseases of fruits, minimizing the losses by suitable packaging and minimal processing operations.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
1	Coffee: Production, processing of coffee, drying, fermentation, roasting and brewing of coffee; decaffeinated coffee, coffee brew concentrate; types, standards and specifications of coffee products; chicory: technology of chicory powder and use in coffee products	Lecture method, audio/video clips, group discussion, quiz	8
2	Tea: Production, composition and manufacturing; types of tea; tea products such as soluble tea, tea concentrate, instant tea, decaffeinated and flavored tea; quality evaluation and grading of tea.	Lecture method, audio/video clips, group discussion, quiz	8
3	Cocoa: processing and analysis of cocoa beans; changes taking place during fermentation of cocoa bean; processing of cocoa products: cocoa powder, cocoa liquor manufacture, cocoa butter; chocolates: types and technology of chocolate manufacturing.	Lecture method, audio/video clips, group discussion, quiz	8
4	Spices, condiments, seasonings and culinary herbs; classification and beneficial properties of spices; processing and manufacturing of major Indian spice: pepper, cardamom, ginger chili and turmeric, clove, garlic, Cumin, coriander, cinnamon, mint and vanilla.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Oleoresins and essential oils: method of manufacture; chemistry of the volatiles; enzymatic synthesis of flavor identical; adulteration problem in spices, packaging of spices.	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

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

Part E

Books	Vere Cruess, W. (1938, January 1). Commercial Fruit and Vegetable Products. seasonings.Kenneth T. Farrell,1 st Edition
Articles	
References Books	Manay, N. S., & Shadaksharaswamy, M. (2008, January 1). Food: Facts and Principles Lal, G., Siddappa, G. S., & Tandon, G. L. (1986, January 1). Preservation of Fruits and Vegetables. Hirasa, K., & Takemasa, M. (1998, June 16). Spice Science and Technology. CRC Press.
MOOC Courses	https://nptel.ac.in/courses/126105023
Videos	https://www.youtube.com/watch?v=-NyDCWuAGfk&t=1s

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Hygiene and Food Sanitation [T]
Course Code	BSFT-503 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student should have studied food microbiology in previous semester			**Co-Requisite/s**	Student should have basic knowledge of food safety, good manufacturing and good laboratory practices			
Course Outcomes & Bloom's Level	**CO1-** CO1: To describe how contamination of food can occur in a food service establishment.**(BL1-Remember)** **CO2-** CO2: Illustrate the effect and consequences of food borne illness.**(BL2-Understand)** **CO3-** CO3: Conduct sound practices to prevent the possibility of food poisoning.**(BL3-Apply)** **CO4-** CO4: Justify measures/procedures that will reduce or eliminate accidents in food preparation and service areas**(BL4-Analyze)** **CO5-** CO5: Identify proper personal hygiene procedures with regard to food handling**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	General principle of food hygiene, Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits. Place of sanitation in food plants. Sanitary aspects of building and equipment: Plant layout and design.	Lecure method, audio/video clips, group discussion, quiz	8
2	Safe and effective insect and pest control: Extraneous materials in foods, Principles of Insects and pets control. Physical and chemical control. Effective control of micro-organisms: micro-organisms important in food sanitation, micro-organisms as indicator of sanitary quality.	Lecture method, audio/video clips, group discussion, review analysis	8
3	Sanitary aspects of water supply: Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water preventing contamination of potable water supply.	Lecture method, audio/video clips, group discussion, classroom presentations	8
4	Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Sanitary aspects of waste disposal. Establishing and maintaining sanitary practices in food plants, role of sanitation, general sanitary consideration and sanitary evaluation of food plants.	Audio/Video clips, group discussion, lecture with ppt, quiz	8

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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Estimation of calorific value of food samples (fruits, bakery products, eggs, nuts, sweets, junk food etc.)	Experiments	BL2-Understand	2
2	Determination of pH and Electrical Conductivity of water	Experiments	BL3-Apply	2
3	Determination of Alkalinity of water sample	Experiments	BL3-Apply	2
4	Determination of Hardness (Total, Permanent & Temporary)	Experiments	BL3-Apply	2
5	Determination of Calcium	Experiments	BL3-Apply	2
6	Determination of Biochemical Oxygen Demand (B.O.D.)	Experiments	BL3-Apply	2
7	Determination of chlorine in water sample.	Experiments	BL3-Apply	2
8	Determination of pH and Electrical Conductivity of soil	Experiments	BL3-Apply	2

Part D(Marks Distribution)

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

Part E

Books	Lawley, R., Curtis, L., & Davis, J. (2008, January 1). The Food Safety Hazard Guidebook. Royal Society of Chemistry.
Articles	
References Books	De Vries, J. (2021, October 8). Food Safety and Toxicity. CRC Press. New York,De Vries.
MOOC Courses	https://nptel.ac.in/courses/110101010
Videos	https://www.youtube.com/watch?v=kSwA9pT_LyY

Course Articulation Matrix

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



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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Quality Management [T]
Course Code	BSFT-504 [T]

Part A

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

Part B

Modules	Contents	Pedagogy	Hours
1	Food Quality: Introduction to food quality management – Definition, quality concepts & attributes-safety, health, sensory, shelf life, extrinsic attributes, factors affecting food behavior, their measurement and evaluation; Sensory and instrumental methods for testing quality Food adulteration and food safety	Lecture method, class presentation, quiz	8
2	Quality assurance, Total Quality Management; GMP, GHP; GLP, CAP; Sanitary and hygienic practices; Food Safety and Quality Requirements – BRC, HACCP - critical control points, reliability and recall; Quality manuals, Risk assessment, Contamination and illness. Handling of food, Process validation.	Lecture method, quiz, Illustrate with analogies	8
3	Indian & International quality systems and standards like ISO; ISO-9000, ISO- 22000, ISO-14000, ISO certification, planning, application, Implementation criteria, requirements, benefits, structure etc.	Lecture method, expert Lecture	8
4	Food Safety and Standards Act of India, 2006; FSS Rules and Regulations, Global Food safety Initiative; inspection, traceability and authentication, certification and quality assurance, documentation and audits	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	International Food Control Systems/Laws, Regulations and Standards/Guidelines with regard to Food Safety– (i) Overview of CODEX Alimentarius. Commission (Members, Standard setting and Advisory mechanisms: JECFA, JEMRA, JMPR): EFSA, WTO agreements (SPS/TBT).	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

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

Part E

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

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Packaging [T]
Course Code	BSFT-505 [T]

Part A

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

Part B

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

Part D(Marks Distribution)

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Product Development and Formulation [T]
Course Code	BSFT-601 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have studied all the core discipline subjects of food technology			**Co-Requisite/s**	Students should have basic knowledge of different concentration terms, food science. nutrition.			
Course Outcomes & Bloom's Level	**CO1-** CO1: To understand the latest consumer demand for novel food products.**(BL1-Remember)** **CO2-** CO2: To learn and develop novel technology to develop new products**(BL2-Understand)** **CO3-** CO3: To understand the Cost analysis and feasibility of new product development**(BL3-Apply)** **CO4-** CO4: Thorough knowledge of sensory and shelf-life evaluations foods**(BL4-Analyze)** **CO5-** CO5: To apply the subject knowledge in future perspectives i.e., such as in research and development in new products**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Need, importance and objectives of formulation for new product development. Ideas, business philosophy and strategy of new product.	Lecture method, group discussion, quiz	8
2	Formulation based on sources availability and cost. competitiveness for concept developments of new products. Standardization of various formulation and product design.	Lecture method, audio-video clips, quiz	8
3	Adaptable technology and sustainable technology for standardized formulation for process development. Process control parameters and scale up, production trials for new product development at lab and pilot scale.	Lecture method, expert lecture	8
4	Quality assessment of new developed products. Market testing and marketing plan. Costing and economic evaluation. Commercialization / product launch.	audio-video clips, expert lecture, quiz	8
5	Food demand and supply – Qualitative and quantitative, production Trends – Factors of Production – Types of Foods like processed semi processed, Ready to eat Foods, Fast Foods. Food Characteristics Nutritional significance of major food groups. Present trends of consumption.	lecture method, industrial visit, audio-video clips	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Market survey of existing various products.	Experiments	BL2-Understand	2
2	Formulation of new products based on corporate decision	Experiments	BL3-Apply	2
3	Product development based on Protein energy rich, Low calorie.	Experiments	BL3-Apply	2
4	Quality assessment of new product development.	Experiments	BL3-Apply	2
5	New product development for; Infant / weaning foods, Geriatric, Physiological status	Experiments	BL4-Analyze	2
6	Preparation of gluten free bread	PBL	BL3-Apply	3
7	Preparation of multi-grain chips	PBL	BL3-Apply	3
8	prepared of baked snacks	PBL	BL3-Apply	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

Books	Fuller, G. W. (1994, February 23). New Food Product Development. CRC Press.
Articles	
References Books	Moskowitz, H. R., Saguy, I. S., & Straus, T. (2009, June 24). An Integrated Approach to New Food Product Development. CRC Press
MOOC Courses	https://nptel.ac.in/courses/109105115
Videos	https://www.youtube.com/watch?v=8ttLyUNzHL4

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Industries by-Products and Waste Management [T]
Course Code	BSFT-602 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student should have studied subjects- processing of cereals and pulses, fruits and vegetables, technology of flesh foods, dairy technology in the previous semesters			**Co-Requisite/s**	Student should have basic knowledge of waste generation and managemnet from different sectors of food industry			
Course Outcomes & Bloom's Level	**CO1-** CO1: Identify various wastes and by-products from food industries and understand their characteristics **(BL1-Remember)** **CO2-** CO2: To describe the various methods of waste treatment and disposal as well as utilization of by-products in food and non-food sectors**(BL2-Understand)** **CO3-** CO3: To analyze the importance of recycling, disposing methods and valorization of food industry waste **(BL3-Apply)** **CO4-** CO4: To apply the legal aspects related to food and packaging waste disposal.**(BL4-Analyze)** **CO5-** CO5: To design and develop a functional ETP or waste utilization approaches to suit requirement of food and environment. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

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

Part C

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

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

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

Course Articulation Matrix

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

Part B

Modules	Contents	Pedagogy	Hours
1	Concept of Entrepreneurship Definition of Entrepreneurship given by various economists the ideal definition –The conceptual model of Entrepreneurship given by John Kao. Views given by Schumpeter Walker & Drucker on Entrepreneurship - Entrepreneur and Manager -Enterprise and Entrepreneur. Managing Creativity Issues to be addressed in working the definition of creativity –Definition -Attributes of a creative person - Creative Thinking and Motivation - Managing Creativity - Organizational Actions that enhance and hinder Creativity -Organizational priorities and Creativity -Managerial responsibilities in a creative organization	Lecture method, audio/Video clips, group discussion, quiz	8
2	Definition of Small Business - Composition of Small Business- Economic Contribution of Small Business. Strategic Planning for Small Business -Steps in Strategic Planning -Develop a clear Mission Statement -Assess Organization Strengths - Conduct a thorough Market Segment Analysis -Analyze Competitors - Create Company Goals - Formulate Strategic Options and Select appropriate Strategies (Focus, Cost leadership & Differentiation) - Translate Strategic Plans into Action Plans-Establish accurate Controls. Why Strategic Planning fails in Small Business. Forms of Ownership: Sole Proprietorship, Partnership& Corporation form of Organization - Advantages and Disadvantages, Franchising- What is Franchising - Advantages and Disadvantages to Franchising - Franchise Evaluation Checklist –Franchise contracts - Types of Franchise arrangements.	lecture method, audio/video clips, group discussion, quiz	8
3	Introduction: Project - definition, features, types, infrastructure creation-a special type of projects, significance of infrastructure in economic development, bottlenecks in the infrastructure creation, Project Identification: Idea generation, Project screening, Feasibility study. The advantages and disadvantages of starting your business –The advantages and disadvantages of buying all existing business – Critical areas to be examined while buying all existing business - Determining the value of a business – Financial Record Keeping – Profit Planning & Cost Control, Project costing: Breakdown structure of the project, cost estimation of the project, factor affecting the cost of the project, Costing with alternative configurations/specifications. Project Appraisal: technical appraisal, marketing appraisal, legal and environment appraisal, financial appraisal- cost estimation of the project and evaluating project using pay back and NPV, Detailed project report – introduction, Introduction to SCBA.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
4	Arrangement of funds: Traditional sources of financing – Equity shares, preference shares, Debentures/bonds, loan from financial institutionsLoan syndication and consortium finance; Alternative sources of financing- Foreign Issue, FDI & FII, ECB, Private equity, Securitization, BOT projects, PPP, Venture capital / Incubation fund, Franchising etc;	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Role played by various Financial Institutions like IDBI, ICICI and IFCI: Special Role played by SIDBI and Commercial Banks – Approval of term loan applications by Commercial Banks – How to decide about a suitable agency for assistance Role played by SFCR and NSIC; Project Implementation: Project contracts – Principles, practical aspects of contacts, legal aspects of project management, global tender, Negotiation for projects, Project insurance, Human resource management, network analysis	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

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

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Entrepreneurship &Supply Chain Management [T]
Course Code	BSFT-603 [T]

Part A

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

Part E

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

Course Articulation Matrix

COs	FO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	2	-	1	1	-	1	-	3	1	1
CO2	3	1	1	-	1	2	1	1	-	1	-	-	3	1	2
CO3	3	1	1	2	-	1	-	1	-	1	2	-	3	1	2
CO4	3	2	1	-	-	-	1	2	1	-	-	-	3	1	3
CO5	3	2	2	2	1	1	1	2	1	2	2	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2019-2020

(SOS)(BSc_FoodTechnology)

Title of the Course	Major Project & Seminar [P]
Course Code	BSFT-604 [P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	6	6
Course Type	Project							
Course Category	Projects and Internship							
Pre-Requisite/s	Deep knowledge of all disciple core subject of Food Technolgy program			**Co-Requisite/s**	Presentation of research project/ internship			
Course Outcomes & Bloom's Level	**CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility**(BL1-Remember)** **CO2-** Identify the needs and problem of the community and involve them in problem solving.**(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

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

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Fruits and Vegetables Technology [T]
Course Code	FT-201 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			**Co-Requisite/s**	Students should have prior knowledge of fruits and vegetables, their parts and various preservation techniques			
Course Outcomes & Bloom's Level	**CO1-** To comprehend the structure, composition, physiological development,post-harvest handling methods, processing and preservation of fruits and vegetables.**(BL1-Remember)** **CO2-** To illustrate the technology of Fruits and vegetables products like juicesand pulps, concentrates and powders, squashes and cordials, beverages, jam, jellies, sauces, etc**(BL2-Understand)** **CO3-** To describe the preservation methods and processing ways of spices develop value added products from them.**(BL3-Apply)** **CO4-** Identify the method of production of dry fruits, tea and coffee.**(BL4-Analyze)** **CO5-** To demonstrate the processing and chemical composition of cocoa beans,cocoa processing and manufacturing process for chocolate.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Status of production and processing of fruits and vegetables, Structural, compositional and nutritional aspects of fruits and vegetables. Physiological development: Growth, Maturation, Ripening and Senescence,climacteric and non-climacteric fruits, Pre and post-harvest changes; pre-harvest factors affecting postharvest quality	Lecture methods,Group discussion, quiz	10
2	Selection of fruits and vegetables for processing,Techniques of processing and preservation of fruits and vegetables by refrigeration and freezing, canning and bottling, drying and dehydration,spoilage of fruits and vegetables	Lecture methods,Audio/Video clips,	10
3	Manufacturing, related calculationsand related defects ofjam, jelly, marmalade, preserve and candy; tomato puree, paste, ketchup, sauce and soup; pickles, drying/ dehydration of fruits and vegetables	Lecture methods,Audio/Video clips, group discussion,	12
4	Manufacturing and calculationsof beverages - fruit Juices, pulps, concentrates, powders, squashes, cordials and RTS, Critical points to consider in the production of different processed fruits and vegetable products and solving the associated problems	Lecture methods,Audio/Video clips, group discussion, quiz	12
5	Possible causes of post-harvest losses and conservation of fruits and vegetable. Post-harvest handling including controlled and modified storage; use of novel packaging, hypobaric storage.	Lecture methods,Audio/Video clips, group discussion,quiz	6

Part D(Marks Distribution)

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

Part E

Books	Preservation of Fruits and Vegetables- Lal G, Siddapa GS and Tandon GL
Articles	https://ifst.onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2621.2001.00513.x
References Books	Post-harvest Technology of Horticultural Crops by Kadar AA. Preservation of Fruits and Vegetables by Lal G, Siddapa GS and Tandon GL Post-HarvestPhysiology, Handling and Utilization ofTropical and Subtropical Fruits and Vegetables by Pantastico B Storage, Processing and Nutritional Quality of Fruits and Vegetables by Salunkhe DK, Bolia HR and Reddy NR Post-Harvest Technology of Fruits and Vegetables by Thompson AK
MOOC Courses	
Videos	

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Principles of Food Processing
Course Code	FT-101[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have graduate degree with the minimum qualifying marks as prescribed at a university/ college in the field of Food technology and related subjects.			**Co-Requisite/s**	Knowledge of food components and food nutrition, should have basic knowledge of food processing methods.			
Course Outcomes & Bloom's Level	**CO1-** Comprehend the principles and methods involved in the processing of foods and discuss the food preservation by heating. **(BL1-Remember)** **CO2-** To describe about irradiation, microwave processing and Ohmic heating as food processing techniques**(BL2-Understand)** **CO3-** To illustrate different freezing techniques, advantages and mechanism of freezing in addition to its effect on food quality. **(BL3-Apply)** **CO4-** Interpret the use of natural as well as chemical and bio- based preservatives to increase the shelf life of food.**(BL4-Analyze)** **CO5-** Recognize different drying methods, different dryers used in food processing and drying mechanisms including sorption isotherm**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction: Definition and scope of food Science and Technology, Historical Development of Food Processing and Preservation, General Principles of Food Preservation. Preservation by Heating: Introduction, thermal resistance of microorganism and enzyme.	Lecture methods,Audio/Video clips, group discussion, quiz	09
II	Irradiation: Source of Radiations, Mode of Action, Effect on Microorganism and different Nutrients, electromagnetic spectrum and applications. Microwave and Ohmic Heating: Principles and application in Food Processing.	Lecture methods, Audio/Video clips, group discussion, Review Analysis	10
III	Freezing: Introduction to freezing, chilling and refrigeration, freezing curve, storage of fresh food, Method of Freezing, Freezing point of selected food (chicken, milk, fruit juice, mushrooms and related), Effect of freezing, Influence of freezing and freezing rate on quality of the food product, Thawing.	Lecture methods, Audio/Video clips, group discussion, classroom presentations	09
IV	Preservation: Introduction, Preservation of food (baked goods, cheese, juices, pickles, sauce, fruits, wines carbonated drinks) by natural and chemical preservatives. Introduction to bio chemicals and their use (shikonin, quinine etc.)	Lecture methods, Audio/Video clips, group discussion, quiz	10
V	Drying and Dehydration: Concept of Water activity, Sun drying of various foods (Apricots, hot pepper or chilies, etc) and its effect on the keeping quality, Sorption, Isotherm and their use. Characteristic of food substances related to their dehydration behavior, Drying phenomenon, factors affecting rate of drying, method of drying of various food products, type of Driers and their suitability of different foods.	Lecture methods, Audio/Video clips, group discussion, quiz	12

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	Potter, N. N., & Hotchkiss, J. H. (2012, December 6). Food Science. Springer Science & Business Media.
Articles	https://www.sciencedirect.com/science/article/abs/pii/S0958166999000154
References Books	Hui, Y. H., Barta, J., Cano, M. P., Gusek, T. W., Sidhu, J. S., & Sinha, N. K. (2008, February 28). Handbook of Fruits and Fruit Processing. John Wiley & Sons. De Vries, J. (2021, October 8). Food Safety and Toxicity. CRC Press.
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	https://www.youtube.com/watch?v=F8jhoaV-nsE

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Fundamentals of Food Chemistry
Course Code	FT-102[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	To pursue this course,student should possess a BSc in Food Technology) degree with the minimum qualifying marks as per the university.			**Co-Requisite/s**	Knowledge of bioactive compounds present in food, chemical bonds and structures related to food products.			
Course Outcomes & Bloom's Level	**CO1-** The student should able to define food chemistry and importance of food chemistry. Student will also learn properties and nutritional importance of water in addition to role of water activity in food stability **(BL1-Remember)** **CO2-** To describe about carbohydrate, its classification, structure and chemical reactions**(BL2-Understand)** **CO3-** To explain about lipids, its classification, structure, physical and chemical properties and causes of rancidity**(BL3-Apply)** **CO4-** To comprehend proteins, its classification, structure, chemical reactions and functional properties. The students will understand to develop a basic idea in new food product development **(BL4-Analyze)** **CO5-** Summarizes about enzymes, their classification and food use. Besides that, students will be able to understand the classification and importance of vitamins and minerals in human diet**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to food chemistry. Water: Its structure types and physical properties, hydrogen bonding. Nutritional significance of water, Water activity and its relation to storage stability of foods, E.R.H, aw of different types of foods.	Lecture methods,Audio/Video clips, group discussion, quiz	09
II	Carbohydrates; their chemical structure and classification, Physical and chemical properties of Carbohydrates. Browning Reactions in Food: Enzymatic and Non-Enzymatic browning.	Lecture methods,Audio/Video clips, group discussion, Review Analysis	10
III	Lipids: their classification and chemical structure. Food and industrial uses of lipids and oxidative changes of lipids, factors responsible for it	Lecture methods,Audio/Video clips, group discussion, classroom presentations	10
IV	Proteins: Physical and Chemical properties of proteins; protein denaturation, protein gels, functional properties of proteins, SCP. Enzymes: their nomenclature and classification. Activation inhibition and kinetics of enzyme activity, immobilized enzymes	Lecture methods,Audio/Video clips, group discussion, quiz	09
V	. Nutritional aspects of Carbohydrates, Proteins, Fats and Vitamins, Acid, Base, Buffer system and Salts. Recommended Dietary Allowances: Concept of Balanced Diet, Menu Planning in Different ages and Diseases, Calorie requirement per day of Human, Respiratory Quotient of food.	Lecture methods,Audio/Video clips, group discussion, quiz	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	20	60	

Part E

Books	Bamji, M. S. (2019, February 28). Textbook of Human Nutrition.
Articles	https://www.sciencedirect.com/science/article/abs/pii/S0924224416303284
References Books	deMan, J. M. (2013, February 1). Principles of Food Chemistry. Springer Science & Business Media. Manay, N. S., & Shadaksharaswamy, M. (2008, January 1). Food: Facts and Principles.
MOOC Courses	https://nptel.ac.in/courses/102105034
Videos	https://youtu.be/DhwAp6yQHQI

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Food and Nutrition
Course Code	FT-103[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have graduation degree in Food technology or in Food Nutrition.		**Co-Requisite/s**	Knowledge of nutrition, biomolecules and relationship between health and diet				
Course Outcomes & Bloom's Level	**CO1-** To describe about digestion and metabolism of carbohydrates, their food sources, and associated deficiency diseases. **(BL1-Remember)** **CO2-** To comprehend digestion and metabolism of fats, their food sources, dietary requirements and associated diseases**(BL2-Understand)** **CO3-** To relate digestion and metabolism of proteins, their food sources, and associated deficiency diseases. They will also learn about role of enzymes in nutrition. **(BL3-Apply)** **CO4-** Summarize digestion and metabolism of fat soluble as well as water soluble vitamins and minerals, their food sources, and associated deficiency diseases. **(BL4-Analyze)** **CO5-** To illustrate nutritional aspects of carbohydrates, proteins, fats and vitamins, recommended dietary allowances, balanced diet and menu planning for different categories **(BL5-Evaluate)**							
Coures Elements	Skill Development ✗ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✓ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	
I	Carbohydrates: Digestion, Metabolism, Food Sources, Deficiency, Metabolic Defects such as Diabetes associated with Carbohydrates.	Lecture methods, Audio/Video clips, group discussion, quiz	12
II	Fats: digestion, Nutritive functions, Dietary Requirements, Metabolism, Food Sources, Effects of Excess and Deficiency: Obesity, Cardiovascular Diseases, and Importance of Lipoproteins.	Lecture methods, Audio/Video clips, group discussion, Review Analysis	12
III	Protein: Digestion, Metabolism, Deficiency Symptoms, Prevention and Cure. Enzymes: Importance and Chemical Nature, Factors affecting Rate of Enzymatic Reactions.	Lecture methods, Audio/Video clips, group discussion, classroom presentations	12
IV	Fat Soluble Vitamins: Salient features, Requirements, Food Sources, Effects of Excess and Deficiency. Water Soluble Vitamins: Salient Features, Requirements, Food Sources, Effects of Deficiency. Minerals: Salient Features, Requirements, Food Sources, Effect of Excess. Deficiency Factors affecting Utilization.	Lecture methods, Audio/Video clips, group discussion, quiz	10
V	Nutritional aspects of Carbohydrates, Proteins, Fats and Vitamins, Acid, Base, Buffer system and Salts. Recommended Dietary Allowances: Concept of Balanced Diet, Menu Planning in Different ages and Diseases, Calorie requirement per day of Human, Respiratory Quotient of food.	Lecture methods, Audio/Video clips, group discussion, quiz	09

Part D(Marks Distribution)

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

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

Part E

Books	M, B. R. (2008, January 1). A Textbook of Foods, Nutrition & Dietetics. Sterling Publishers Pvt. Ltd.
Articles	https://www.sciencedirect.com/science/article/pii/S027795369800104X
References Books	Srilakshmi, B. (2012) Dietetics. New Delhi: New Age International (P) Limited Publishers. Hames, B. D., & Hooper, N. M. (2005, January 1). Biochemistry. Garland Science.
MOOC Courses	https://nptel.ac.in/courses/126104004
Videos	

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Product Development, Food Laws and Quality Control
Course Code	FT-104[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have basic graduate degree of Food Technology with minimum qualifying marks as per the University.			**Co-Requisite/s**	Student must have studied Basic food laws and regulations in previous semester. Knowledge of food laws, quality control and assurance			
Course Outcomes & Bloom's Level	**CO1-** To comprehend the fundamentals of nutraceuticals, nutrigenomics and functional foods. They will also learn the applications of rheology and texture profile analysis in product development**(BL1-Remember)** **CO2-** To describe, basics of product development, different steps of product development process and innovation strategies are covered which will enhance the capability of student's thinking while developing a new food product. **(BL2-Understand)** **CO3-** To evaluate different aspects of food quality, total quality control and management, statistical quality control methods, which will help him to learn the development and maintenance quality of new product. **(BL3-Apply)** **CO4-** To explore basics of food safety laws and regulations governing the country and the world **(BL4-Analyze)** **CO5-** Illustrate technology to development new food products (product qualities, raw material properties, processing, packaging requirement, distribution and marketing). **(BL5-Evaluate)**							
Coures Elements	Skill Development ✗ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production)				

Course Articulation Matrix

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

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to nutraceuticals, Nutrigenomics and Functional foods, Introduction and applications of rheology, texture profile.	Lecture methods,Audio/Video clips, group discussion, quiz	10
II	Concept of product development - product success and failure, factors for success, process of product development, managing for product's success. Innovation strategy - possibilities for innovation, building up strategy, product development programme.	Lecture methods,Audio/Video clips, group discussion, Review Analysis	09
III	Ways of describing of Food Quality, Quality control and Quality Assurance functions. Total Quality Control (TQC) and the role of management/ TQM. Statistical quality control. Quality costs	Lecture methods, Audio/Video clips, group discussion, classroom presentations	11
IV	Food standards and Specifications: Compulsory and voluntary trade and Company standards. Consumer, company, In-process and finished product specifications. Relevant Food laws: PFA, FPO, SWMA, MPO, AgMark, and BIS Standards.	Lecture methods, Audio/Video clips, group discussion, quiz	10
V	The knowledge base for product development technology – knowledge and the food system, knowledge management, knowledge for conversion of product concept to new product, technological knowledge (product qualities, raw material properties, processing, packaging requirement, distribution and marketing	Lecture methods, Audio/Video clips, group discussion, quiz	10

Part D(Marks Distribution)

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

Part E

Books	Wheelwright, S. C. (2010, July 6). Managing New Product and Process Development. Simon and Schuster.
Articles	https://www.sciencedirect.com/science/article/abs/pii/S0924224412002592
References Books	Losso, J. N., Shahidi, F., & Bagchi, D. (2007, April 5). Anti-Angiogenic Functional and Medicinal Foods Earle, M., Earle, R., & Anderson, A. (2001, September 18). Food Product Development. Elsevier.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Sensory Evaluation and By-product Utilization
Course Code	FT-105[T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Completed Bsc in Food Technology/ Food Processing/ Food Engineering			**Co-Requisite/s**	Knowledge of food processing and preservation			
Course Outcomes & Bloom's Level	**CO1-** To analyze the basic concepts of sensory evaluation and requirements of a sensory laboratory. **(BL1-Remember)** **CO2-** To illustrate criteria for selection of sensory panelists, sensory quality parameters and factors affecting sensory measurements. **(BL2-Understand)** **CO3-** To define different sensory tests like discrimination, descriptive, affective; flavor profile and tests; ranking tests, detection, threshold and dilution tests. **(BL3-Apply)** **CO4-** Summarizes by-product utilization of different fruits such as apple, grape, papaya, orange, citrus, mango. **(BL4-Analyze)** **CO5-** The course will provide an understanding about nutritional quality of foods and its assessments like Digestibility, Biological value, NPU, PER, etc. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to sensory analysis, general testing conditions, Requirements of sensory laboratory; organizing sensory evaluation programmers.	Lecture methods,Audio/Video clips, group discussion, quiz	09
II	Selection of sensory panelists; Factors influencing sensory measurements; Sensory quality parameters - Size and shape, texture, aroma, taste, color and Gloss	Lecture methods,Audio/Video clips, group discussion, Review Analysis	10
III	Different tests for sensory evaluation– discrimination, descriptive, affective; Flavor profile and tests; Ranking tests, Detection, threshold and dilution tests.	Lecture methods,Audio/Video clips, group discussion, classroom presentations	10
IV	By Product utilization of different fruits such as apple, grape, papaya, orange, citrus, mango.	Lecture methods,Audio/Video clips, group discussion, quiz	10
V	Nutritional Quality of foods and its assessments: Food proteins (Digestibility, Biological value, NPU, PER)	Lecture methods,Audio/Video clips, group discussion, quiz	09

Part D(Marks Distribution)

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

Part E

Books	Ramaswamy, H. S., & Marcotte, M. (2005, August 23). Food Processing. CRC Press.
Articles	https://www.sciencedirect.com/science/article/abs/pii/095032939390314V
References Books	Lal, G., Siddappa, G. S., & Tandon, G. L. (1986, January 1). Preservation of Fruits and Vegetables Fortin, N. D. (2016, October 25). Food Regulation. John Wiley & Sons.
MOOC Courses	https://nptel.ac.in/courses/126105336
Videos	

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	lab Course-I
Course Code	FT-106[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Ccurse Category	Discipline Core							
Pre-Requisite/s	NA			**Co-Requisite/s**	NA			
Course Outcomes & Bloom's Level	**CO1-** To recognize the importance and different ways of food preservation**(BL1-Remember)** **CO2-** To describe the composition of food and interaction of different food components with each other during processing and storage. **(BL2-Understand)** **CO3-** To estimate the effect of different processing on nutritional value of food and other components. **(BL3-Apply)** **CO4-** To apply the processing methods in real life to preserve food for longer term.**(BL4-Analyze)** **CO5-** To evaluate the spoilage in foods, its critical analysis and prevention strategies**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Examination of the enzymatic browning in fruits and vegetables	Experiments	BL2-Understand	3
II	Determination of Total Soluble Solids (TSS), pH, and titratable acidity in given samples	Experiments	BL2-Understand	3
III	Examination of the catalase and peroxidase activity in fresh and blanched samples.	Experiments	BL3-Apply	3
IV	Study the effect of blanching on vitamin C content in given food sample	Experiments	BL3-Apply	3
V	Study the effect of nitrites on meat colour	Experiments	BL4-Analyze	3
VI	Estimation of sodium Benzoate in Food sample	Experiments	BL3-Apply	3
VII	Determining proximate composition of given food sample	Experiments	BL4-Analyze	3
VIII	Determination of vitamin C from citrus fruits	Experiments	BL4-Analyze	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	40				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

Books	Ranganna, S. (1986, January 1). Handbook of Analysis and Quality Control for Fruit and Vegetable Products.
Articles	
References Books	Bower, J. A. (2016, December 3). Simple Methods for Detecting Food Adulteration. Createspace Independent Publishing Platform.
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Lab course-II
Course Code	FT-107[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	NA			**Co-Requisite/s**	NA			
Course Outcomes & Bloom's Level	**CO1-** To analyze the basic concepts of sensory evaluation and requirements of a sensory laboratory. **(BL1-Remember)** **CO2-** To illustrate criteria for selection of sensory panelists, sensory quality parameters and factors affecting sensory measurements**(BL2-Understand)** **CO3-** To define different sensory tests like discrimination, descriptive, affective; flavor profile and tests; ranking tests, detection, threshold and dilution tests. **(BL3-Apply)** **CO4-** To analyse the food materials using instruments and compare the properties with sensory evaluation**(BL4-Analyze)** **CO5-** To predict the industrial utilization of different under-utilized by-products and train the panellists for sensory evaluation**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Introduction to Sensory methods	Experiments	BL2-Understand	3
I	To prepare serial dilution of given food substances	Experiments	BL3-Apply	3
I	To perform different samoling methods of foods	Experiments	BL3-Apply	3
I	To examine the microbial load of different food samples	Experiments	BL3-Apply	3
I	To check adulteration in foodstuffs	Experiments	BL3-Apply	3
I	Use nine-point hedonic scale for sensory evaluation	Experiments	BL3-Apply	3
I	Dio-trio test for sensory evaluation	Experiments	BL4-Analyze	3
I	Preparation of dilution sample for sensory evaluation	Experiments	BL4-Analyze	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	40				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	0

Part E

Books	Lawless, H. T., & Heymann, H. (2010, September 27). Sensory Evaluation of Food. Springer Science & Business.
Articles	
References Books	Moskowitz, H. R. (1983, January 1). Product Testing and Sensory Evaluation of Foods.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Microbiology [T]
Course Code	FT-202 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Studentss should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.		**Co-Requisite/s**	Students should have basic knowledge of microbiology, microorganisms causing food spoilage, basic preservation techniques.				
Course Outcomes & Bloom's Level	**CO1-** To classify and identify the beneficial and spoilage microorganisms associated with food besides learning the factors influencing growth of microorganism on foods**(BL1-Remember)** **CO2-** To comprehend different methods of preservation like high temperature, low temperature, drying, food additives and radiation.**(BL2-Understand)** **CO3-** To illustrate Food-borne illnesses, poisoning, infections andintoxications as well as spoilage of different kinds of foods like cereals, fruits, vegetables, animal products.**(BL3-Apply)** **CO4-** To describe the principle of food fermentation, different Indian fermented foods and importance of probiotics.**(BL4-Analyze)** **CO5-** To predict Biochemical changes caused by microorganism, food hygiene and sanitation.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	General characteristics, classification and identification of Lactic acid bacteria, Acetic acid bacteria, Clostridium, Proteolytic bacteria, Lipolytic bacteria, fungi, and algaein food industry, sources of contaminations: air, water, sewage, post processing contamination. Growth curves (different phases), synchronous growth, doubling/generation time,Factors influencing growth of microorganism on foods, Intrinsic factors and Extrinsic factors.	lecture methods,Group discussion, quiz	10
2	General principles of preservation, asepsis, anaerobic conditions by use of high temperature, by low temperature, drying, food additives and radiations, hurdle technology, novel non-thermal methods of food preservation and microbial destruction	lecture methods, Audio/Video clips,	9
3	Characteristic features, dynamics and spoilage of different kinds of foods: Cereals, fruits, vegetables, animal products – meat, fish, poultry and milk and milk products. Food-borne illness, food borne poisoning, infections and intoxications.Toxins produced by Staphylococcus, Clostridium, Aspergillus; bacterial pathogens-Salmonella, Bacillus, Listeria, E. coli, Shigella, Campylobacter.	lecture methods, Audio/Video clips	11
4	Food fermentation: Microbial culture in food fermentations and their maintenance & evaluation, Traditional fermented food of India. Therapeutic value of fermented food. Probiotics and prebiotics: Introduction, uses, importance, Safety considerations on probiotics, application of probiotics and prebiotics in food industry	lecture methods, Group discussion, quiz	10
5	Biochemical changes caused by microorganism - putrefaction, and lipolysis, Antagonism and Synergism in microorganism. Food hygiene and sanitation.Indicator organisms; rapid methods in detection of microorganisms. Thermal inactivation of microbes- Concept, determination & importance of TDT, F, Z & D values, factors affecting heat resistance	lecture methods, Audio/Video clips, quiz	10

Part D(Marks Distribution)

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

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Tools and Techniques [T]
Course Code	FT-203 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			**Co-Requisite/s**	Students should have basic knowledge regarding various analytical techniques like chromatography, Spectroscopy and principles of these methods.			
Course Outcomes & Bloom's Level	**CO1-** To discover different kinds of chromatographic techniques, theirprinciples and applications. Main focus is to discuss the use of advanced chromatographic techniques in food analysis.**(BL1-Remember)** **CO2-** To insight about principle and various types of electrophoresis methods ,mainly SDS- PAGE and capillary electrophoresis.**(BL2-Understand)** **CO3-** To comprehend Principle, types and applications of centrifugation will be introduced to students. The course willalso cover principle and applications of ultra-centrifugation in food industry.**(BL3-Apply)** **CO4-** To describe the principle of spectrophotometry, working of a spectrophotometer and itsand different types of spectrophotometric techniques like UV, Visible, IR and fluorescenc espectroscopy, AAS, Polarimetry and Refractometry**(BL4-Analyze)** **CO5-** To illustrate different methods to estimate the food constituents like carbohydrates,proteins, minerals, vitamins, and lipids.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Chromatographic technique: principle and application of adsorption, column, partition and affinity chromatography, Size exclusion chromatography and Ion exchange chromatography, Advance chromatographic techniques.	Lecture methods,Group discussion,	12
2	Electrophoresis: Introduction, principle and types of electrophoresis, PAGE, Capillary electrophoresis, SDS- PAGE, Isoelectric focusing and Isotachophoresis.	Lecture methods,Audio/Video clips,	10
3	Centrifugation: Principle, RPM, RCF, rotor types,and applications of centrifugation in food processing, Ultra centrifugation and their types, applications in food industry	Lecture methods, classroom presentations	9
4	Spectroscopic techniques: Lamberts-Beer law, Colorimetry, Principle and application of UV, Visible, IR and fluorescence spectroscopy, AAS, FTIR, Polorimetry and Refrectrometry.	Lecture methods,Audio/Video clips, quiz	12
5	Sampling methods, sample preparation,Determination of Carbohydrates – sugars, fibre, starch; Lipid – free fatty acids and fats, Proteins – amino acids and soluble and insoluble proteins, Vitamins andMinerals from food products, Measurement of color, flavor, taste and texture using sophisticated instruments	Lecture methods,Group discussion, quiz	12

Part D(Marks Distribution)

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

Part E

Books	Kirk, R. S., & Sawyer, R. (1991, January 1). Pearson's Composition and Analysis of Foods. Addison-Wesley Longman Limited.
Articles	https://www.tandfonline.com/doi/pdf/10.1080/20014091091878
References Books	Debnath, M. (2005, January 1). Tools and Techniques of Biotechnology. Nielsen, S. (2003, April 30). Food Analysis. Springer Science & Business Media.
MOOC Courses	https://nptel.ac.in/courses/106101224
Videos	https://youtu.be/1qKsm0A41lM?si=J-I_zLmqPhxInmkf

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Engineering [T]
Course Code	FT-204 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			**Co-Requisite/s**	Students should have prior knowledge of heat and mass transfer, basic physics principals and laws.			
Course Outcomes & Bloom's Level	**CO1-** To accomplish knowledge about fundamentals of food engineering and thermodynamics.**(BL1-Remember)** **CO2-** To give an insight about the chemical kinetics of processed foods, quality changes during storage of foods, size reduction, homogenization and mixing**(BL2-Understand)** **CO3-** To comprehend about thermal processing of foods and student will learn the use and applications of heat exchangers and aseptic canning.**(BL3-Apply)** **CO4-** To illustrate the basics of chilling and freezing, cryogenic freezing and calculation of freezing time for typical foods**(BL4-Analyze)** **CO5-** To summarize different modes of heat transfer like conduction, convection and radiation and their applications in food industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG11(Sustainable cities and economies)				

Course Articulation Matrix

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

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to food engineering, Introduction to thermodynamics, fundamentals of heat, Mass transfer in food processing.Energy and material balance, Numerical problems on material balance related to food processing	Lecture methods,Audio/Video clips, group discussion, quiz	10
2	Chemical Kinetics - kinetics of reactions occurring in processed foods, velocity constant, order of reaction, Quality changes during storage of foods. Size reduction,Homogenization, Mixing and Forming.	Lecture methods,Audio/Video clips, group discussion, Review Analysis	12
3	Thermal processing of foods - Commercial sterility, Pasteurization. Sterilization. Determination of TDT, heat exchangers, types of flows. Aseptic canning process, hydrostatic sterilizer and asepticpackaging design problems	Lecture methods, Audio/Video clips, group discussion, classroom presentations	11
4	Chilling and freezing, Properties of frozen foods; freezing point depression. Cryogenic freezing and IQF. Types of Freezers; Calculation of Freezing Time for typical foods (Fruits and Vegetables) Psychrometry: Properties of air- water vapour mixture, psychometric chart, Application of psychrometry to drying; related numerical problems.	Lecture methods,Audio/Video clips, group discussion, quiz	12
5	Heat transfer: Heat flow in fluids by conduction and convection. Individual heat transfer coefficients, overall coefficient, Heating and cooling of fluids, Heat transfer equipment. Radiation. Heat transfer in turbulent flow. Applications and use in food industries	Lecture methods,Audio/Video clips, group discussion, quiz	10

Part D(Marks Distribution)

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

Part E

Books	Gupta, S., & Kapoor, V. (2020, September 10). Fundamentals of Mathematical Statistics. Sultan Chand & Sons.
Articles	https://www.cabidigitallibrary.org/doi/full/10.5555/19810466570
References Books	Gillett, B. E. (1976, January 1). Introduction to Operations Research. McGraw-Hill Companies.
MOOC Courses	https://nptel.ac.in/courses/103107088
Videos	

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Syllabus-2019-2020

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Packaging Technology [T]
Course Code	FT-205 [T]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			**Co-Requisite/s**	Student should have basic knowledge of food packaging materials.			
Course Outcomes & Bloom's Level	**CO1-** To explore the fundamentals of food packaging and different packaging materials-paper, glass, plastics, metal, and cans.**(BL1-Remember)** **CO2-** To comprehend different types of packaging forms like modified atmospheric packaging, control atmospheric packaging, vacuum packaging and retortable plastic packaging**(BL2-Understand)** **CO3-** To describe packaging requirements and application for different food products like red meat, fish, poultry, eggs, milk and milk products, cereal product, bakery and confectionary products, fruits and vegetables :fresh and processed, oils and fats.**(BL3-Apply)** **CO4-** To illustrate recent advances in packaging techniques like edible packaging, microwavable packaging, intelligent packaging and active packaging**(BL4-Analyze)** **CO5-** To demonstrate testing of packaging materials, Bar code labelling and packaging laws and regulations. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Background of food packaging, functions and levels, Origin of packaging material. Different packaging materialsand their manufacturing- paper, glass, plastics, metaland cans, Tatra packaging.	Lecture methods,Group discussion, quiz	10
2	Rotatable plastic packaging- structure of rsetort pouches and their fabrication,Modified atmospheric packaging- reasons, requirement, application for different food, limitation. Control atmospheric packaging. Vacuum packaging. Machineries requirements for MPA, CAP and vacuum packaging	Lecture methods,Audio/Video clips, group discussion	10
3	Packaging of different foods: requirement and application; Red meat, fish, poultry, eggs, milk and milk products, cereal product, bakery and confectionary products, fruits and vegetables: fresh and processed,oils and fats.	Lecture methods,Audio/Video clips, group discussion, classroom presentations	10
4	Edible packaging, Microwavable packaging, Intelligent packaging- sensors, indicators and barcodes; Active packaging – oxygen scavengers, ethylene scavengers, moisture scavengers, antioxidant and antimicrobial packaging, Aseptic packaging: principles and requirements	Lecture methods,Audio/Video clips, quiz	12
5	Testing of packaging materials – grammage, vibration tests, tensile strength, puncture resistance, bursting strength, etc., Barcode labeling, package desingn,Information printing on the package. Packaging laws and regulation.	Lecture methods,Group discussion, quiz	8

Part D(Marks Distribution)

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

Part E

Books	Gillett, B. E. (1976, January 1). Introduction to Operations Research. McGraw-Hill Companies.
Articles	https://www.researchgate.net/profile/Kenneth-Marsh-3/publication/5850700_Food_PackagingRoles_Materials_and_Environmental_Issues/links/5a046cf8a6fdcc1c2f6062e0/Food-PackagingRoles-Materials-and-Environmental-Issues.pdf
References Books	Harrington, J. P., & Jenkins, W. A. (1991, February 18). Packaging Foods with Plastics. CRC Press. Crosby, N. T. (1981, January 1). Food Packaging Materials. Elsevier Applied Science.
MOOC Courses	https://nptel.ac.in/courses/127106237
Videos	https://youtu.be/0b3As1QHvk8

Course Articulation Matrix

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

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BSC (PCM/CS)

School of Sciences

15 June .2019

Agenda of BOS

School of sciences is going to organize a BOS meeting on 15 June 2019 from 02.30 P.M. onwards by on line platform (Google meet).The agenda of the meeting is to finalize

- Finalization of the changes in Scheme and syllabus of B.Sc. PCM/CS , 2019Batch

All kindly attend the meeting and give their valuable suggestions.

List of Member for attending BOS

S.No	Name of Faculty	Designation
1	Dr. Richa Kothari	Chairman (Dean)
2	Dr. . Sonia Johri	Dean Academics
3	Dr. Renu Jain	Prof & Head, School of 'Mathematics and Ailied Sciences, Jiwali University, Gwalior (Expert Maths)
4.	Dr S.K Shrivastava	External Expert (Chemistry) Professor Jiwaji University Gwalior
5	Dr. R K Tiwari	Professor Jiwaji University Gwalior (Expert Physics)
6	Dr.Santosh Sharma	Prof. & Head Mathematics
7	Dr. Dinesh Singh Tomar	Member
8	Dr. Y.C. Goswami	Member (Phy.)
9	Dr. Manish Sharma	Member (Maths)
10	Dr. Ranjana Goswami	Member(Chemistry)
11	Dr. Rupali Rastogi	Member(Chemistry)
12	Dr Uday P Gahlaut	Member(Physics)
13	Ms.Chanda Purushwani	Member (mathematics)
14	Ms. Hema Purushwani	Member(Mathematics)

Dean School of Sciences
Dr. Richa Kothari
Professor & Dean
School of Sciences
ITM University, Gwalior (M.P.

Dean
School of Science ITM University
Gwalior (M.P.)-INDIA-474001

Copy to:
1. Hon'ble Vice Chancellor
2. Registrar
3. Dean Academics
4. Concern Member

For kind information

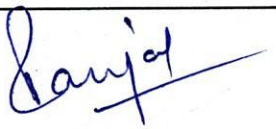
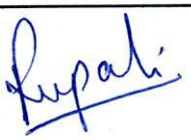
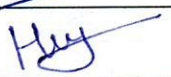
School of Sciences

Attendance Sheet and Minutes of meeting of the Board of Studies held on 15. June2019

School of Sciences has organized an on line Board Of Studies meeting on 15 June 2019, 02:30 PM through online platform

Following faculty members were present in the meetings

S.No	Name of Faculty	Signature
1	Dr. Richa Kothari	
2	Dr. . Sonia Johri	
3	Dr. Renu Jain	
4	Dr. S.K Shrivastava	
5	Dr. R K Tiwari	
6	Dr. Santosh Sharma	

7	Dr. Dinesh Singh Tomar	
8	Dr. Y.C. Goswami	
9	Dr. Manish Sharma	
10	Dr. Ranjana Goswami	
11	Dr. Rupali Rastogi	
12	Dr Uday P Gahlaut	
13	Ms.Chanda Purushwani	
14	Ms. Hema Purushwani	

School of Sciences

Minutes of Meetings

The chairman and coordinator welcomed the members of the board and outlined the changes to be made with the approval of the board as given here

1. Minutes of previous Board of studies were reviewed.

2.Following subject syllabus are revised

(i) Algebra and Trigonometry in I semester
(ii) Calculus and Differential Equations in II semester
(iii) Vector Analysis & Geometry in III semester
(iv) Physical Chemistry - I in I semester
(v) Organic Chemistry – I in I semester
(vi) Inorganic Chemistry – I in II semester
(vii) Mechanics & Properties of Matter in I semester
(viii) Thermodynamics & Statistical Physics in II semester

Read and confirmed

Dr. Renu Jain

Dr. Richa Kothari

Dr. Sonia Johri

Dr. S.K Shrivastava

Dr. Manish Sharma

Dr. R K Tiwari

Dr. Y.C. Goswami

Dr. Dinesh Singh Tomar

Dr. Ranjana Goswami

Dr. Rupali Rastogi

Dr Uday P Gahlaut

Dr. Hema Purushwani

Dr. Santosh Sharma

Dr. Chanda Purushwani

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CELEBRATING DREAMS

Syllabus-2019-2020

(SOS)(BSc_PCM)

Title of the Course	Algebra and Trigonometry
Course Code	BSMA0101[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	4	0	8
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of determinant, matrix, quadratic equations, coefficient, roots.			**Co-Requisite/s**	Trigonometry functions. Fundamental concept of prepositions and logical connectives.			
Course Outcomes & Bloom's Level	**CO1-** To learn about the expansions of trigonometric functions and related problems.**(BL1-Remember)** **CO2-** The learner will become proficient in various types of hyperbolic functions.**(BL2-Understand)** **CO3-** The learners will acquire skills of solving problems in logarithm of complex quantities. **(BL3-Apply)** **CO4-** To learn about the summation of Trigonometric series and related problems.**(BL4-Analyze)** **CO5-** To acquire knowledge of polar of point, pair of Tangents, equation of chord with respect to parabola and ellipse.**(BL5-Evaluate)**							
Course Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗			**SDG (Goals)**	SDG4(Quality education)			

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Rank of a matrix, Normal & Echelon form of a matrix, Characteristic equation of a matrix, Eigen values and Eigen vectors including Power Method, Diagonalization, Linear independence of row and column matrix.	Audio/Video clips, group discussion, lecture with PPTs, quiz	8
Unit 2	Cayley- Hamilton theorem and its use in finding inverse of a matrix, Application of matrix to solve a system of linear (homogenous and non-homogenous) equations, Theorems on consistency and inconsistency of a system of linear equations, Solving linear equation up to three unknowns.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 3	Theory of Equations: Root of a Multiplicity, Synthetic Division Method, Greatest Common Divisor Method, Relation between the roots and coefficients of a general polynomial equation in one variable, Transformation of equations, Reciprocal equation, Descartes rule of signs.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 4	Logic– Logical connectives, Truth tables, Tautology, Contradiction, Logical equivalence, Algebra of propositions. Boolean Algebra– Definition and properties, Switching circuits and its applications, Logic gates and circuits.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 5	De Moivre's theorem and its applications, Direct and inverse circular and hyperbolic functions, Expansion of trigonometric functions, Logarithm of complex quantities, Gregory's series, Summation of trignometrical series.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	28

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	1. S. I. Loney – Plane Trigonometry Part – II 2. K. B. Dutta – Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd. New Delhi, 2000 3. Chandirka Prasad – A Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd. Allahabad. 4. C. L. Lui – Elements of Discrete Mathematics (Second Edition). McGraw Hill, International Edition, Computer Science Series, 1986.
Articles	
References Books	1. H. S. Hall and S. R. Knight – Higher Algebra H. M. Publication, 1994 2. N. Jacobson – Basic Algebra Vol. I and II, W. H. Freeman. 3. I. S. Luther and I. B. S. Passi – Algebra Vol. I and II, Narosa Publication House. 4. N. Saran and R. S. Gupta – Analytical Geometry of Three Dimension, Pothishala Pvt. Ltd. Allahabad.
MOOC Courses	https://nptel.ac.in/courses/111101001
Videos	

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_PCM)

Title of the Course	Vector Analysis & Geometry
Course Code	BSMA0303[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of calculus.			**Co-Requisite/s**	Basic knowledge of scalar quantities, vector quantities and co-ordinate geometry.			
Course Outcomes & Bloom's Level	**CO1-** To remember basic concept of vector analysis and Three –Dimensional geometry which used in various problems of sciences. **(BL1-Remember)** **CO2-** To understand and identify the scalar and vector product of three vectors , vector differentiation , gradient and curl, system of conic , tracing of conic, center of coincides , equation of cone with given base **(BL2-Understand)** **CO3-** To apply the concept of Gauss theorem , stock theorem , green theorem and other concept of vector analysis also the concept of three dimensional geometry to solve various problems of physical and allied sciences by using the concept and properties of straight line , cone , paraboloids , ellipsoid and Hyperboloids .**(BL3-Apply)** **CO4-** To analyze and draw connection among the ideas of vector analysis and there dimension geometry (conic system) and there properties to solve various problems of physical and allied sciences.**(BL4-Analyze)** **CO5-** To evaluate gradient ,divergence ,curl ,equation of cone with given base, generator of cone , equation of paraboliods and generating line also identifying and provide the various applications related to them.**(BL5-Evaluate)**							
Course Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Scalar and vector product of three vectors, product of four vectors, Reciprocal vectors, vector differentiation, Gradient, Divergence and curl	Audio/Video clips, group discussion, lecture with PPTs, quiz	8
Unit 2	Vector Integration, Greens Theorem, Stokes Theorems and Gauss divergence Theorem and problems based on them.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 3	General equation of second degree, Tracing of conics, System of conics, Polar equation of a conic.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 4	Equation of cone with given base, Generators of cone, Condition for three mutually perpendicular generators, Right circular cone, Equation of cylinder and its properties.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 5	Central conicoids, Paraboliods, Plane sections of coniciods, Generating lines	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	28
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	1. N. Saran and S. N. Nigam, Introduction to Vector Analysis, Pothishala Pvt. Ltd. Allahabad. 2. Gorakh Prasad and H. C. Gupta, Text Book on Coordinate Geometry, Pothishala Allahabad.
Articles	
References Books	1. Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co. New Delhi. 2. P. K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Willey Eastern Ltd., 1994
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ma24/peview
Videos	https://onlinecourses.nptel.ac.in/noc24_ma08/review

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

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

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Syllabus-2019-2020

(SOS)(BSc_PCM)

Title of the Course	Mechanics & Properties of Matter
Course Code	BSPH0101[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Knowledge of Physics upto class 12 level			**Co-Requisite/s**	Knowledge of Mathematics upto class 12 level			
Course Outcomes & Bloom's Level	**CO1-** To remember the basic laws of mechanics and general properties of matter,**(BL1-Remember)** **CO2-** Understand the basic concepts of Newtonian Mechanics**(BL2-Understand)** **CO3-** To enable students to apply the Laws of mechanics to various mechanical systems**(BL3-Apply)** **CO4-** To analyze the applications of Laws of mechanics to various mechanical systems.**(BL4-Analyze)** **CO5-** To evaluate the laws of mechanics and its application to various mechanical systems**(BL5-Evaluate)**							
Course Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕			**SDG (Goals)**	SDG4(Quality education)			

Part B

Modules	Contents	Pedagogy	Hours
1	Mathematical Physics Addition, subtraction and product of two vectors; Polar and axial vectors and their examples from physics; Triple and quadruple product (without geometrical applications); Scalar and vector fields; Differentiation of a vector; Repeated integral of a function of more than one variable; Unit tangent vector and unit normal vector; Gradient, Divergence and Curl; Laplacian operator; Idea of line, surface and volume integrals; Gauss', Stokes' and Green's Theorems, Jacobian Application	Audio/Video clips, lecture with ppt, on white board, quiz	8
2	Mechanics Position, Velocity and Acceleration Vector, Components of velocity and acceleration in different coordinate systems. Newton's Laws of motion and its explanation with problems, various types of forces in nature (explanation), Pseudo Forces (e.g. Centrifugal Force), Coriolis force and its applications. Motion under a central force, Derivation of Kepler's laws. Gravitational law and field, Potential due to a spherical body. Gauss & Poisson's equation of Gravitational self-energy. System of particles, Centre of mass and reduced Mass. Elastic and inelastic collisions	Audio/Video clips, lecture with ppt, on white board, quiz,	8
3	General Properties of Matter Elastic moduli and their relations Determination of Y of rectangular thin bar loaded at the center; Torsional oscillations, Torsional rigidity of a wire, to determine η by torsional oscillations Surface Tension: Surface Tension, Angle of Contact, Capillary Rise Method; Energy required to raise a liquid in capillary tube; Factors affecting surface tension; Jeager's method for Determination of surface tension; Applications of Surface Tension. Concept of Viscous Forces and Viscosity; Steady and Turbulent Flow, Reynolds's number; Equation of Continuity; Bernoulli's Principle; Application of Bernoulli's equation - (i) Speed of Efflux (ii) Venturimeter (iii) Aspirator Pump(iv) Change of plane of motion of a spinning ball	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	8
4	Oscillations Concept of Simple, Periodic & Harmonic Oscillation with illustrations; Differential equation of harmonic oscillator; Kinetic and potential energy of Harmonic Oscillator; Oscillations of two masses connected by a spring; Translational and Rotational motion, Moment of Inertia and their Product, Principal moments and axes, Motion of Rigid Body, Euler's equation.	Audio/Video clips, lecture with ppt, on white board, quiz,	8
5	Relativistic Mechanics Michelson-Morley experiment and its outcome; Postulates of Special Theory of Relativity; Lorentz Transformations. Simultaneity and order of events; Lorentz contraction; Time dilation; Relativistic transformation of velocity ,frequency and wave number; Relativistic addition of velocities; Variation of mass with velocity	Audio/Video clips, lecture with ppt, on white board, quiz,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To verify triangles law	Experiments	BL2-Understand	3
2	To find out Youngs Modules fromcantilever	Experiments	BL3-Apply	3
3	To find out moment of inertia fly wheel	Experiments	BL3-Apply	3
4	To verify Parallel and Perpendicular Axis theorem	Experiments	BL4-Analyze	3
5	To verify the forces in different members of jib crane	Experiments	BL4-Analyze	3
6	To verify parallelograms law using Gravesend Apparatus	Experiments	BL4-Analyze	3
7	To measure the diameter of rod using vernier calipers	Experiments	BL2-Understand	3
8	To measure the diameter of a pin using screw gauge	Experiments	BL2-Understand	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	28
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	30

Part E

Books	1 University Physics by Sears and Zeemansky 2. Fundamentals of Physics, Halliday Resnick
Articles	
References Books	1 Mechanics by D S Mathur 2 Properties of Matter by DS Mathur
MOOC Courses	https://www.bing.com/videos/riverview/relatedvideo?q=mechanics+and+matter+course+online&qpvt=mechanics+and+matter+course+online&view=riverview&mmscn=mtsc&mid=2BFD84AB433
Videos	https://www.bing.com/videos/riverview/relatedvideo?q=mechanics+and+matter+course+online&qpvt=mechanics+and+matter+course+online&view=riverview&mmscn=mtsc&mid=2BFD84AB433

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

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

OMVEER SINGH

Digitally signed by OMVEER SINGH
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