



SU/BOS/Science/349

Date: 24/06/2024

To,

The Principal,
All Concerned Affiliated Colleges/Institutions
Shivaji University, Kolhapur

Subject: Regarding Minor Change syllabi of B.Sc. Part-I (Sem.I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

Ref: SU/BOS/Science/877/ Date: 26/12/2023 Letter.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the Minor Change syllabi, nature of question paper B.Sc. Part-I (Sem. I & II) as per NEP-2020 (2.0) degree programme under the Faculty of Science and Technology.

B.Sc.Part-I (Sem. I & II) as per NEP-2020 (2.0)			
1.	Food Science and Technology (Entire)	6.	Biochemistry
2.	Food Science	7.	Biotechnology (Optional/Vocational)
3.	Food Science and Quality Control	8.	Biotechnology (Entire)
4.	Food Technology & Management (Entire)	9.	Pollution
5.	Computer Science (Opt)	10.	Environmental Science (Entire)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2024-2025 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in NEP-2020@suk(Online Syllabus)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2024 & March/April 2025. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Dy Registrar
Dr. S. M. Kubal

Copy to:

1	The Dean, Faculty of Science & Technology	4	B.Sc. Exam/ Appointment Section
2	Director, Board of Examinations and Evaluation	5	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	6	Affiliation Section (U.G.) (P.G.)

SHIVAJI UNIVERSITY, KOLHAPUR



Established: 1962

A⁺⁺ Accredited by NAAC (2021) with CGPA 3.52

Structure and Syllabus in Accordance with

National Education Policy - 2020

With Multiple Entry and Multiple Exit

Syllabus For

B.Sc. Part-I

Food Science and Quality Control

(Faculty of Science and Technology)

SEMESTER I AND II

(To Be Implemented From Academic Year 2024-25)

Shivaji University, Kolhapur
NEP-2020 (2.0) Credit Framework First Year
Bachelor of Science (Food Science and Quality Control)

SEM (Level)	COURSES			OE	VSC/SEC	AEC/ VEC,/IKS	OJT/ FP/CEP, CC/RP	Total Credits	Degree/Cum.Cr. MEME
	COURSES- 1	COURSES- II	COURSES - III						
Sem-I (4.5)	DSC-I Food Chemistry-I (2) DSC-II Food Microbiology I (2) DSCP-I Lab Course I: Practical based on DSC I & II (2)	DSC-I(2) DSC-II (2) DSCP-I Lab Course II: Practical based on DSCI & DSC II (2)	DSC-I(2) DSC-II (2) DSCP-I Lab Course III : Practical based on DSC I& DSC II (2)	OE-I Introduction To Food Processing & Preservation (T) (2)	-	IKS-I (2) Interdisciplinary course in Generic IKS		22	UG Certificate 44
Sem-II (4.5)	DSC-III Food Chemistry II (2) DSC-IV Food Microbiology II (2) DSCP-I Lab course IV: Practical based on DSC III & IV (2)	DSC-III(2) DSC-IV(2) DSCP-I Lab Course V:: Practical based on DSC III & DSC IV (2)	DSC-III(2) DSC-IV(2) DSCP-I Lab Course VI: Practical based on DSC III & DSC IV (2)	OE-II Introduction To Food Processing & Preservation Lab (P) (2)	-	VEC -I(2) Democracy, Election and Constitution)		22	
Credits	8(T)+4(P) = 12	8(T)+4(P) = 12	8(T)+4(P) = 12	2+2 = 4 (T/P)	--	2+2 = 4		44	Exit Option:4 Credits NSQF/Internship/Skill Courses

Course Outcomes:

A candidate who wishes to graduate in B.Sc. (Food Science and Quality Control) needs to have acquired/developed following competencies:

- Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food, Nutrients, in food processing and preservation.
- Students will be able to deliver effective presentation of food safety, quality and hygiene to the general public.
- Students will gain ability to function as an individual as well as a member of team.
- Students will understand the impact of Food Science and Quality Control in society and Environmental context for sustainable development.
- Students will be able to carry out Nutritional evaluation of food products and shelf- life.
- Students will develop vertical progression to higher studies.
- Students will be promoted for start-up projects.

Program Specific Outcomes:

- Expose the participant to the basic essentials of Food Technology & preservation so that they become capable of independently handling food processing units.
- Students will be able to understand the nutritional side which may help to inculcate the scientific view regarding dietary habits of population.
- Enabling the participants to keep themselves abreast of recent changes in Food Technology and Management.
- Creating necessary awareness amongst students regarding the laws affecting Food Processing and Preservation.
- Inculcating entrepreneurship attitude and self-employment attitude in students.

SEMESTER-I
F.Y.B.Sc.(Food Science And Quality Control)SEMESTER I
DSC-I:Food Chemistry - I
 [CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

- To understand the chemistry of foods-composition of food, role of each component and their interaction.
- To understand the functional aspects of food components and to study their role in food processing

		No. of Lecture: 30
Unit I	Introduction to Food Chemistry <ul style="list-style-type: none"> • Definition • Composition of food 	1. Lectures.
Unit II	Water <ul style="list-style-type: none"> • Definition of water in food • Structure of water • Types of water • Water activity & shelf life. 	9. Lectures.
Unit III	Lipids <ul style="list-style-type: none"> • Classification of lipid • Physical property- melting point, softening point, specific gravity, refractive index • Chemical properties-Iodine value, peroxide value, saponification value • Effect of frying on fats • Changes in fats & oil- Rancidity, Lipolysis, Flavor reversion. • Auto-oxidation & its prevention. Technology of edible fats & oil- Refining, hydrogenation & interest reification	10. Lectures.

Unit IV	Protein <ul style="list-style-type: none"> • Protein classification & structure • Nature of food protein (plants& animal Protein) • Properties of protein(Electrophoresis, Denaturation) • Functional properties (solubility, gelation, emulsification, foaming). 	10 Lectures
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SEMESTER-I

F.Y.B.Sc.(Food Science And Quality Control)SEMESTER-I

DSC-II:Food Microbiology - I

[CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

- To know importance genera of microorganisms associated with food & their characteristics
- To understand the role of microbes in fermentation , spoilage & food born diseases

		No. of Lecture: 30
Unit I	Introduction to Food Microbiology <ul style="list-style-type: none">• History & development of food microbiology• Definition & scope of microbiology• Importance of microbiology in food	6. Lectures.
Unit II	Characteristics of microorganisms in food <ul style="list-style-type: none">• Types of microorganisms associated with food• Morphology & structure of microorganisms• Factors affecting the growth of microorganisms	8. Lectures.
Unit III	Culture media & staining techniques <ul style="list-style-type: none">• Common Components of media & their functions• Types of media- living, nonliving• Classification of stains- acidic, basic & neutral• Staining procedure-Simple, negative, Gram & differential.	8. Lectures.
Unit IV	Contamination , Spoilage of foods <ul style="list-style-type: none">• Source of Contamination microorganisms in food• Important food spoilage microorganisms.• Spoilage of specific food groups-milk & dairy products, meat, poultry & sea food,cereal & cereal products, fruits, vegetable & canned products.	8. Lectures.

DSC Pract.-I:PRACTICALS BASED ON DSC I & II

[CREDITS-02; PRACTICALS-60hours,Practicals/week-02]

Paper I &II: Food Chemistry –I Lab And Food Microbiology -I Lab

Course Outcomes :-

1. To understand the basic techniques in Microbiology laboratory
2. To study the working principle ,handling and use of compound microscope for the study of microorganisms
3. To understand the working principles and applications various equipment's in laboratory
4. To study the preparation, sterilization and use of various cultural media.

Food Chemistry I Lab (Group A)

1. Introduction to laboratory instrument.
2. Preparation of lab solution.
3. Determination of hardness of water.
4. Estimation of moisture content.
5. Isolation of starch from potato.
6. Qualitative tests for carbohydrates.

Food Microbiology I Lab (Group B)

1. Introduction to microbiological instruments.
2. Study of Compound Microscope
3. Demonstration, Construction &Working of Laboratory equipment
4. Study of different ingredients of culture media
5. Preparation & sterilization of Agar & broth.
6. Preparation of slant, plates using nutrient agar

SEMESTER-II

F.Y.B.Sc.(Food Science And Quality Control)SEMESTER I

DSC-III: Food Chemistry - II

[CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

- To understand the chemistry of foods-composition of food, role of each component and their interaction.
- To understand the functional aspects of food components and to study their Nutrients.

		No. of Lecture: 30
Unit I	Carbohydrates <ul style="list-style-type: none">• Classification of Carbohydrates• Structures of important polysaccharides• Chemical reaction of Carbohydrates-oxidation, reduction, with acid & alkali.• Modified Cellulose & Starches	9. Lectures.
Unit II	Vitamins <ul style="list-style-type: none">• Definition & classification• Structure, importance & stability• Water soluble vitamins & their sources• Fat soluble vitamins & their sources	8. Lectures.
Unit III	Minerals <ul style="list-style-type: none">• Definition• Classification of minerals• Sources & deficiency of minerals• Toxic minerals.	7. Lectures.
Unit IV	Flavor <ul style="list-style-type: none">• Definition & basic tastes• Chemical structure & taste• Description of food flavor• Flavors Enhancer	6. Lectures.

SEMESTER-II

F.Y.B.Sc.(Food Science And Quality Control)SEMESTER I

DSC-IV: Food Microbiology - II

[CREDITS-02;LECTURES-30;LEC/WEEK-02]

Course Outcomes:

- To make well conversant about food preservation techniques
- To know importance genera of microorganisms associated with food & their characteristics
- To understand the role of microbes in fermentation , spoilage & food born diseases

		No. of Lecture: 30
Unit I	Food born disease <ul style="list-style-type: none">• Definition• Food born infection• Food born intoxication• Prevention of food born diseases	8. Lectures.
Unit II	Cultivation of microorganisms <ul style="list-style-type: none">• Pure Culture techniques• Method of isolation & cultivation• Enumeration of microorganisms- Qualitative & Quantitative	8. Lectures.
Unit III	Control of microorganisms in food <ul style="list-style-type: none">• Principle & method of preservation• Physical method of food preservation- High temperature & low temperature.• Bio preservatives esp. Bacteriocin	8. Lectures.
Unit IV	Food Fermentation <ul style="list-style-type: none">• Definition• Microorganisms used in food fermentation.• Fermented foods.	6. Lectures.

DSC Pract.-II PRACTICALS BASED ON DSC III& IV

[CREDITS-02; PRACTICALS-60hours, Practical's/week-02]

Paper II &II: Food Chemistry –II Lab and Food Microbiology –II Lab

Course Outcomes:

1. To understand the basic techniques in Microbiology laboratory
2. To understand the basic laboratory experiments to isolate and cultivate
3. To understand the working principles and applications various equipment's in laboratory
4. To study the preparation, sterilization and use of various cultural media.

Group A: Food Chemistry II Lab

1. Estimation of Moisture Content.
2. Determination of pH of Fruit Juice sample.
3. Isolation of Casein from Milk.
4. Gelatinization of food starch.
5. Smoke point of fats and Oils.
6. Effect of acid and alkali on colour of fruits and vegetable

Group B: Food Microbiology II Lab

1. Cultivation & Sub – culturing of microbes.
2. Microbial Examination of Air.
3. Morphological study of bacteria & fungi using permanent slides.
4. Study of Gram staining.
5. Preparation of fermented product.

References books–

1. James M. Jay (1987), Modern Food Microbiology, CBS Publishers and Distributors.
2. S.P.Narang (2016), Food Microbiology, APH Publishing Corporation.
3. SinhaU. (1994), an Introduction to Bacteria, Vikas Publishing House Pvt. Ltd.
4. Bibek Ray, Arun Bhunia (2018) Fundamental Food Microbiology 5th Edition, CRC Press.
5. Fennema, Owen R, Food chemistry, 3rd edition Marcel Dekker, New York 1996
6. De Man, J.M., Principle of food chemistry AVI, New York, 1980
7. Potter, N.N. & Hotchkiss, J.H., Food Science, 5th. Chapman& Hall, 1995
8. H. Thapar, Food Chemistry 1st edition Pacific books international 2011

List of Minimum Equipment's

1. Hot airoven–1
2. Incubator- 1
3. Autoclave -1
4. Refrigerator–2
5. Digital balance -2
6. pH meter -1
7. Seitzfilter–1
8. Centrifuge-1
9. Colorimeter-1
10. Distilled Water Plant–1
11. Laminar air flow cabinet-1
12. Arrangements for gas supply and fitting of two burner separable.
13. One working table of 6'x2½'fortwostudents.
14. One separate sterilization room attach to the laboratory(10'x15')
15. Colony counter
16. Water bath
17. One separate instrument room attached to lab(10'x15')
18. One laboratory for one batch in clouding working tables(6'x2½')per two students for one batch
19. Storeroom(10'x15')
- 21..Lactometer

Academic year 2024-25

Part – I Semester – I

SEMESTER-I									
Sr. No.	Course Code	Teaching Scheme			Examination Scheme				
		Theory and Practical			University Assessment(UA)			Internal Assessment(IA)	
		Lectures(Per week)	Practical hours (Per week)	Credit	Max. Marks	Min. Marks	Exam. Hours (Hrs.)	Max. Marks	Min. Marks
1	Course I DSC I: Food Chemistry I	2	-	2	40	14	1.5	10	04
2	Course I DSC II: Food Microbiology I	2	-	2	40	14	1.5	10	04
3	Course I DSCP-I Practical based on Subject I- DSC I &II	-	2	2	50	18	-	-	-
4	Course II DSC I : Botany - I	2	-	2	40	14	1.5	10	04
5	Course II DSC II : Botany - II	2	-	2	40	14	1.5	10	04
6	Course II DSCP-I Lab Course II: Practical based on DSCI & DSC II	-	2	2	50	18	-	-	-
7	Course III DSC I : Zoology - I	2	-	2	40	14	1.5	10	04
8	Course III DSC II : Zoology - II	2	-	2	40	14	1.5	10	04
9	Course III DSCP-I Lab Course III : Practical based on DSCI& DSC II		2	2	50	18	-	-	-
10	OE I	2	-	2	40	14	1.5	10	04
11	IKS I: Interdisciplinary course in Generic IKS	2	-	2	40	14	1.5	10	04
	Total (A)			22	470			80	

SEMESTER-II									
Sr. No.	Course Code	Teaching Scheme			Examination Scheme				
		Theory and Practical			University Assessment(UA)			Internal Assessment(IA)	
		Lectures (Per week)	Practical hours (Per week)	Credit	Max. Marks	Min. Marks	Exam . Hours (Hrs)	Max. Marks	Min. Marks
1	Course I DSC III: Food Chemistry II	2	-	2	40	14	1.5	10	04
2	Course I DSC IV : Food Microbiology II	2	-	2	40	14	1.5	10	04
3	Course I DSCP-I Lab course IV:Practical based on DSC III & IV	-	2	2	50	18	-	-	-
4	Course II DSC III: Botany III	2	-	2	40	14	1.5	10	04
5	Course II DSC IV Botany IV	2	-	2	40	14	1.5	10	04
6	Course II DSCP-I Lab Course V::Practical based on DSC III & DSC IV	-	2	2	50	18	-	-	-
7	Course III DSC III: Zoology III	2	-	2	40	14	1.5	10	04
8	Course III DSC IV: Zoology IV	2	-	2	40	14	1.5	10	04
9	Course III DSCP-I Lab Course VI: Practical based on DSC III & DSC IV	-	2	2	50	18	-	-	-
10	OE II:	2	-	2	40	14	1.5	10	04
11	VEC I: Democracy, Election and Constitution	2	-	2	40	14	1.5	10	04
	Total (B)			22	470			80	
	Total (A+B)			44	940			160	

Theory and Practical Lectures: 60 Minutes Each	Total Marks for Bsc. Food Science And Quality Control Part- I : 1100
<ul style="list-style-type: none"> • DSC-Discipline specific Course • OE-Open Elective • VEC: Value Education course 	Total Credits for Bsc Part-I (Semester I & II) : 44
	Duration of Practical Examination as per respective BOS guidelines <ul style="list-style-type: none"> • Separate passing's mandatory for Theory, Internal and Practical Examination

❖ **Nature of question Paper and Marking Scheme**

A. University Assessment for 40 Marks :-

B.Sc (Food Science and Quality Control) (Part-) (Semester-) Examination
Course Name (Course Code)

Day & Date:

Total Marks: 40

Time:

Instruction: 1) All the Question are Compulsory.

2) Figures to the right indicate full Marks.

Q.1) Select the correct alternatives from the given choices. [08]

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Q.2) Answer the following Questions (Any 4 out of 6) [16]

- 1.
- 2.
- 3.

Q.3) Answer the following Questions (Any 2 out of 4) [16]

- 1.
- 2.
- 3.
- 4.

❖ **B. Internal Assessment For 10 Marks**

B.sc (Food Science and Quality Control) Part I – Assignments.

B.sc (Food Science and Quality Control) Part II – Unit Test.

❖ **C. Practical Examination :University Assessment For 50 Marks**

B.Sc (Food Science and Quality Control) (Part-) (Semester-) Examination
Course Name (Course Code)

Day & Date:

Time:

Total Marks: 50

Instructions:

- 1) All Questions are Compulsory.**
- 2) Figures to the right indicate full marks.**
- 3) Draw Neat labeled diagram wherever Necessary**

Q.1. Principle Writing.	[05]
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Q.2. Perform the Experiment.	[25]
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Q.3. Journal	[10]
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Q.4. Viva.	[10]
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SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

National Education Policy (NEP) 2.0

**Syllabus for
Bachelor of Science Part I in**

Food Science and Quality Control

Open elective courses (OE)

Syllabus to be implemented From June 2024 onwards.

Shivaji University, Kolhapur
NEP-2020 (2.0) Credit Framework First Year
Bachelor of Science (Food Science and Quality Control)

SEM (Level)	COURSES			OE	VSC/SEC	AEC/ VEC,/IKS	OJT/ FP/CEP, CC/RP	Total Credits	Degree/Cum.Cr. MEME
	COURSES- 1	COURSES- II	COURSES - III						
Sem-I (4.5)	DSC-I Food Chemistry-I (2) DSC-II Food Microbiology I (2) DSCP-I Lab Course I: Practical based on DSC I & II (2)	DSC-I(2) DSC-II (2) DSCP-I Lab Course II: Practical based on DSCI & DSC II (2)	DSC-I(2) DSC-II (2) DSCP-I Lab Course III : Practical based on DSC I& DSC II (2)	OE-I Introduction To Food Processing & Preservation (T) (2)	-	IKS-I (2) Interdisciplinary course in Generic IKS		22	UG Certificate 44
Sem-II (4.5)	DSC-III Food Chemistry II (2) DSC-IV Food Microbiology II (2) DSCP-I Lab course IV: Practical based on DSC III & IV (2)	DSC-III(2) DSC-IV(2) DSCP-I Lab Course V:: Practical based on DSC III & DSC IV (2)	DSC-III(2) DSC-IV(2) DSCP-I Lab Course VI: Practical based on DSC III & DSC IV (2)	OE-II Introduction To Food Processing & Preservation Lab (P) (2)	-	VEC -I(2) Democracy, Election and Constitution)		22	
Credits	8(T)+4(P) = 12	8(T)+4(P) = 12	8(T)+4(P) = 12	2+2 = 4 (T/P)	--	2+2 = 4		44	Exit Option:4 Credits NSQF/Internship/Skill Courses

B.Sc. I Structure in Food Science and Quality Control NEP 2.0 Open Electives

Sr. No.	Semester	Course Title	Credits	Hours of teaching	Marks
1.	I	OE – I Introduction To Food Processing and Preservations (Theory)	2	30	50
2.	II	OE- II Introduction to Food Processing and Preservations Lab (Practical)	2	30	50

B.Sc. Part-I / Semester- I

OE I Title: Introduction to Food Processing and Preservations: 30 hrs. / Marks-50

(Credits: 02)

Course Outcome :-

1. Understand the importance of food preservation and processing in food industries.
2. Learn the principles of food preservation methods to solve problems in food stability.
3. Think about new food processing techniques to preserve and development of new food products. 4. Demonstrate the causes of food spoilage and the effective techniques to reduce the spoilage

Unit I: Introduction to Food Science

(06 Hrs)

- Classification of Food
- Functions of Food
- Types of Food Quality

Unit II: Food Spoilage

(06 Hrs)

- Introduction to food spoilage
- Types and causes of food spoilage
- Physicochemical changes in food
- Microbial changes in food.

Unit III: Food Preservation

(06 Hrs)

- Importance of Food Preservation
- Principle of Food Preservation
- Preservation by Drying Method(High Temperature / Low Temperature)

Unit IV: Food Processing

(06 Hrs)

- Introduction of Food Processing
- Importance of Food Processing
- Classification of Food Processing Methods

Unit V: Processing & Preservation of Food Products

(06 Hrs)

- Spoilage of fruits and vegetables, And Dairy Products
- Important of Preservation Fruit and Vegetables and Dairy Products
- Processing of Fruit and Vegetable, Dairy Products.

References:-

- Sivasankar, B. (2002). Food processing and preservation. PHI Learning Pvt. Ltd.
- Smith, J. S., & Hui, Y. H. (Eds.). (2008). Food processing: principles and applications. John Wiley & Sons.
- 5. Desrosier, N. W., & Desrosier, J. N. (1977). The technology of food preservation (No. Ed. 4). AVI Publishing Company, Inc.

B.Sc. Part-I / Semester- II
OE II-Lab Title: Introduction to Food Processing and Preservations Lab
(Practical): 30 hrs.Marks-50,(Credits: 02)

1. Study of processing equipment's.
2. Processing of Fruit Pulp.
3. Preparation of Jam.
4. Preparation of Jelly.
5. Preparation of Ketchup.
6. Preparation of Khoa.
7. Preparation of Paneer.
8. Preparation of Flavor Milk.
9. Preparation of Chakka.
10. Preparation of Ice-cream.

