

## **Sant Gadge Baba Amravati University, Amravati**

**Faculty:** Science and Technology

**Programme:** B.Sc. with Food Science (Semester III)

### **POs:**

Students of undergraduate general degree programme at the time of graduation will be able to

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PO1.Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, check out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2.Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest contexts socio-technological changes.

### **PSOs:**

**Students can be able to-**

1. Gain insight of food science including the history and fundamental properties of food
2. Acquire the skill in the use and care of basic food Science laboratory equipment
3. Perform basic laboratory procedures in food science.
4. Understand the integral role of food science and different branches of food science related subjects.
5. Acquainted with the basic chemistry of food

### **Employability Potential of the Programme:**

It has been a long felt necessity to align higher education with the emerging needs of the economy so as to ensure that the graduates of higher education system have adequate knowledge and skills for employment and entrepreneurship. The higher education system has to incorporate the requirements of various industries in its curriculum, in an innovative and flexible manner to produce holistic and well groomed graduates.

Food Science is a branch of science that deals with study of food regarding its chemistry, benefits, nutrition, biochemistry, quality control, processing, etc. It includes the

study of food related with basic and applied sciences related with the food industries, adulteration and Government recognized agencies

The cumulative demand for trained and skilled manpower in the area of food science requires in-depth functional knowledge of modern food science and related subject through hands-on training for the students. The syllabus has been prepared to anticipate the requirement of students under the CBCS program. The contents have been drawn to accommodate the widening horizon of the food science discipline and reflect the changing needs of the students. The detailed syllabus for each paper is appended with a list of suggested readings. The degree of Bachelor of Science in Food Science (Choice Base Credit system) aims to explore various aspects of Food Science and interdisciplinary subject to the students. The program in Food Science as one of the core subjects is designed to cultivate a scientific attribute and interest in the modern area of Food Science and related subjects in particular and life science in general. This will help the students to become critical and curious in their outlook.

The course is designed to impart the essential basics of Food Science at the initial level of graduation. The basic course is infused with application in modern life science, and awareness of Food Science and its influence on human life. The integration of various courses in the program is aimed to develop proficiency in theory as well as practical experiments, common equipment, and laboratory, along with the collection and interpretation, and presentation of scientific data in a proper manner.

Besides this, the students will be equipped with knowledge in the newer area of food science and its application in different sectors like nutrition, food production, processing, and preservation, food adulteration, hygiene, and sanitation, food laws and regulations, food microbiology, and sensory evaluation. This will create awareness about Food Science and its contribution to food science in society. At the end of the course, the students are expected to have good working knowledge in the field of food science and in addition knowledge gained from a course interdisciplinary in nature.

Food Science overcomes challenges in food production, processing, and preservation. The production of value-added food products is the greatest example. Almost all food industries need pure water. The bacterial quality of water is tested by a food scientist. The food industry provides large scope for food Scientists. Our students have occupied jobs in different food industries. Food Scientist always helps in introducing technology that aims to enhance the production, processing, packaging, and preservation of food production.

Students will surely have an urge to continue higher studies in Food science and contribute significantly to the development. The present syllabus is restricted to anticipating the future needs of food Science with more emphasis on imparting hands-on skills. The main thrust is laid on making the syllabus compatible with developments in education, research, Industrial, and Govt. sectors. The theory and Practical course in the new restructured course will lead to impart skill set essential to further food Science.

After completion of the B.Sc. in Food science, students can do post graduation in Food and nutrition, food technology, and Food Science at different institutes and universities. Some examples are Kolhapur University, Paul University, Pune University, SNDT Mumbai and PGTD of Home Science, Sant Gadge Baba Amravati University, Amravati.

### **Summarized Carrier opportunities after doing B.Sc. with subject food science:**

Student opting for B. Sc. Food science subject have opportunities in the field of food and nutrition as well as technology. Some of the avenues are listed below,

1. Teaching: Teaching profession can be chosen in the colleges and other institutions offering the courses related to food science, nutrition, catering and hotel management as well as nursing
2. In food Industries: As shift supervisors, production officers/ managers, quality control analyst, research scientist, purchasing, and marketing personals
3. In hospitals: As dietitians
4. In Government sectors: Food analysts (Food and Drugs)
5. In hotel industries: Chef, supervisors
6. Entrepreneurship: There is huge market of food and food products. Many food manufacturing units can be started in low investment as compared to other industries. So By completing these subjects they can start production of many products such as fruits candies, squash, juices, jams, jelly, ketchup, pickles, canned vegetables, bakery and confectionaries, spices, Indian snacks (Farsan, chevda, shev, chakli, etc.), potato, banana chips, milk and milk products, etc.

Hence, Board of Studies in Biochemistry (Including Microbiology and Food Science) in its meeting held on / /2023 resolved to accept the revised syllabus for B. Sc. II Sem. III and IV (Food Science) based on Choice Based Credit System (CBCS) as per UGC guidelines. The detailed syllabus for each paper is appended with a list of suggested readings.

**Sant Gadge Baba Amravati University Amravati**

**Scheme of teaching, learning & Examination leading to the Degree Bachelors of Science (Choice Based Credit System) (Three Years Six Semesters Degree Programme- C.B.C.S)  
(B.Sc. Part-II) (Semester-III) FOOD SCIENCE**

Sr .N	Subjects	Subject Code	Teaching & Learning Scheme							Duration of Exams Hrs.	Examination and Evaluation Scheme						
			Teaching Period Per week				Credits				Maximum Marks				Minimum Passing		
			L	T	P	Total	Theor y	Practic al	Total		Theory + MCQ External	Skill Enhancement module Internal	Practical		Total Marks	Marks	Grade
1	FSC (3S) Basic Biochemistry and Food Microbiology (Theory )	FSC3-T	6			6	4.5		4.5	3 hours	80	20	Internal	External	100	40	p
2	FSC ( 3S) Practical	FSC3-P			6	6		2.25	2.25	4 Hours			25	25	50	25	p
3	Total		6		6	12	4.5	2.25	6.75	7 hours	80	20	25	25	150	65	P

## Syllabus Prescribed for 2023-2024 UG Programme

**Programme: UG with Food Science**

**Semester-III**

Code of the Course /Subject	Title of the Course/Subject	Total Number of Periods
FSC3-T	<b>Basic Biochemistry and Food Microbiology</b>	<b>90</b>

**Cos**

After completion of this course the student will able to

- Understand the importance and working of enzymes
- Diagram the digestive system and the digestion path followed by food
- Summarize the metabolism of carbohydrates
- Justify the role of enzymes in the metabolism of lipids
- Classify microorganisms and justify their importance in food
- Compare various microorganism according to their properties

COURSE MODULE	UNIT	CONTENT
<b>DSC</b>	Unit-I Digestion and Enzymes	Enzymes: Introduction, classification, and specificity of enzyme; Factors affecting the enzyme activity and inhibition of enzymes; Mechanism of enzyme action (lock & key theory and induced fit theory) Digestion of Food: Important organs in Gastro intestinal tract with their functions; Digestion and absorption of carbohydrates, proteins and lipids in mouth, stomach, and intestines; Enzymes involved in the digestion and absorption <span style="float: right;"><b>(15 Periods)</b></span>
	Unit-II Metabolism	Metabolism of carbohydrates: Utilization of glucose; Names and introduction to various pathways of glucose metabolism; Glycolysis and TCA cycle (reactions and energetic); Metabolism of lipids: $\beta$ -oxidation of fatty acids (reactions and energetic); Biosynthesis of lipids (lipogenesis); definitions; Introduction to cholesterol; Metabolism of protein: Transamination, deamination; ammonia formation and functions; Urea cycle (reactions and energetic) <span style="float: right;"><b>(15 Periods)</b></span>
	Unit-III Microorgani sms in Food	Taxonomy: Components and major characteristics used in taxonomy; Three domain system of microorganisms; Bacteria: introduction, general characteristics, size, shape, colony characteristics; Classification of bacteria (Gram positive Gram negative, etc.)

		<p>Bacterial species important in food;  Fungi: Introduction, general characteristics, and classification;  Yeast &amp; Moulds: Size, shape, Structure, important organs, difference between yeast &amp; moulds.  Genera, types of yeast and moulds important in food such as <i>mucor Rhizopus</i>, <i>Aspergillus</i>, <i>Penicillium Tri-chothecium</i>, etc. and their applications  A short introduction to Algae, Actenomycetes, Protozoa. <b>(15 Periods )</b></p>
	Unit-IV Microbial nutrition and growth	<p>Food Microbiology: Introduction;  Microbial cell: Structure, important organs, and types;  Growth of microorganisms: Synchronized and balanced growth, generation time, exponential growth and rate constant, Microbial growth curve;  Factors affecting the growth of microorganisms;  Methods of measurement of growth  Mode of nutrition and nutritional requirement. <b>(15 Periods)</b></p>
	Unit-V Basic Microbiological Techniques	<p>Cultivation of microorganisms: pure culture, isolation of pure culture;  Media: types, composition, preparation, maintenance and preservation;  Sterilization processes, staining and observation;  Types of staining: simple, differential staining, gram staining, spore staining;  Enumeration of microorganisms: types and methods;  Microbial contamination: causes and prevention; <b>(15 Periods)</b></p>
<b>SEM</b>	Skills in Biochemistry and Microbiology of Food	<p>a. Demonstration and understanding of mechanism of enzyme action with the help of chart and module  b. Demonstration of metabolism of carbohydrates, proteins, fats with the help of charts and module  c. Diagrammatic understanding of growth curve of microorganism  d. Collection of local samples of molds and their staining  e. Demonstration and handling of equipments <b>(15 Periods)</b></p>
		<p>Cos  By the end of this module, the students will be able to:  1. Understand the digestive system and metabolism  2. Compare various microorganisms and their staining</p>
<b>**Activities for SEM:</b>	<p>1.Class test(10M)  2. Assignment(5M)  3. Visit to Food Industry or Laboratory/Group discussion /Seminars and projects/Any innovative activity (5M).</p>	

## Syllabus Prescribed for 2023-2024 UG Programme

**Programme: UG with Food Science**

**Semester-III**

Code of the Course /Subject	Title of the Course/Subject	Total Number of Periods
FSC3-P	FSC-(3S) Practical	06 / per week /per batch

### COs

**At the end of the Lab/Practical course, the students will be able to**

1. Acquire the skills in the use and care of basic Food microbiology equipments.
2. Understand the working of enzymes
3. Prepare various types of media
4. Perform the staining of microorganisms
5. Analyze the food samples for the microbial contamination
6. Isolate the microorganism from the sample of food or water

### Practical: 3S Food Science

#### List of Practical/Laboratory Experiments/Activities etc.

1. Study of salivary amylase activity
2. The working and handling of various equipments
3. Preparation and sterilization of media
4. The techniques of aseptic transfer of microbes
5. Isolation of bacteria by streak plate technique
6. Preparation of staining solution
7. Identification of microorganisms by simple staining
8. Identification of microorganisms by gram staining
9. Staining of yeast and moulds.
10. Microbial analysis of water and food stuff

**The distribution of marks for the practical examination shall be as follows:**

External Examination		Internal Examination	
Performance of any two experiments	20 Marks	Attendance & students performance	10 Marks
Viva-voce	05 Marks	Practical Record book	10 Marks
		Viva-voce	05 Marks
<b>Total</b>	<b>25 Marks</b>	<b>Total</b>	<b>25 Marks</b>

## Course Material/Learning Resources

1. Fundamental of Biochemistry; Dr. A. C. Deb; Center Book Agency.
2. Fundamental of Biochemistry; J.L. Jain, Sanjay Jain; C. Chand.
3. Textbook of Biochemistry; Dr. Mn Chatterjee, Dr. Rana Shinde; Jaypee Brothers.
4. Laboratory Techniques in Food Analysis; D. Pearson; Butterworths.
5. Principle of Biochemistry; Lehninger AL, New Delhi Kalyani
6. Textbook of Biochemistry; G. R. Agrawal.
7. Biochemistry West E S Biochemistry , Delhi Oxford New Delhi
8. A Dictionary of Biochemistry Sharma J L New Delhi CBS Publication
9. Nutrition & Dietetics 1st and 2nd Edition; Subhangini Joshi.
10. Microbiology Vol.I &II by C.B. Powar and H.F.Daginawala.
11. Microbiology by M.A. Peleazar, R.D. Reid & C.S. Chan, Tata Macgraw Hill Publication Co limited, New Delhi.
12. Food Microbiology by W.C. Fraizer, Tata Macgraw Hill Publication.
13. Introduction to Microbiology by A.S. Rao
14. Food Microbiology by Adam Moss
15. Dairy Microbiology by Parihar & Parihar
16. Food Microbiology by Bohra Pradeep. Jodhpur Arobios India
17. Text book of Microbiology Purohit S, Jodhpur Arobios India
18. Food Microbiology Bohara & Parihar, Jodhpur Agrobias
19. Industrial Microbiology, Patel A H, Mumbai Mcmillan, Mumbai
20. General I Microbiology Vol I & II , Dr. Pawar C B Mumbai Mcmillan, Mumbai
21. Good contaminants origin Propagation and Analysis Mahindra SN New Delhi APH Publication
22. Applied microbiology Dr. Parihar Pramila , New delhi Swastik Publication
23. Food and Dairy Microbiology Dr Rao M K New Delhi Mangalam publication
24. Modern Food Microbiology Jay J M , New Delhi CBS Publication
25. A Dictionary of Microbiology Sharma JL, New Delhi CBS Publication
26. Basic Food Microbiology , New Delhi CBS Pulication



## **Sant Gadge Baba Amravati University, Amravati**

**Faculty:** Science and Technology

**Programme:** B.Sc. with Food Science (Semester IV)

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3. In hospitals: As dietitians
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5. In hotel industries: Chef, supervisors
6. Entrepreneurship: There is huge market of food and food products. Many food manufacturing units can be started in low investment as compared to other industries. So By completing these subjects they can start production of many products such as fruits candies, squash, juices, jams, jelly, ketchup, pickles, canned vegetables, bakery and confectionaries, spices, Indian snacks (Farsan, chevda, shev, chakli, etc.), potato, banana chips, milk and milk products, etc.

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**Sant Gadge Baba Amravati University Amravati**

**Scheme of teaching, learning & Examination leading to the Degree Bachelors of Science (Choice Based Credit System) (Three Years Six Semesters Degree Programme- C.B.C.S)  
(B.Sc. Part-II) (Semester-IV) FOOD SCIENCE**

Sr .N	Subjects	Subject Code	Teaching & Learning Scheme							Duration of Exams Hrs.	Examination and Evaluation Scheme						
			Teaching Period Per week				Credits				Maximum Marks					Minimum Passing	
			L	T	P	Total	Theor y	Practic al	Total		Theory + MCQ Externa l	Skill Enhancemen t module Internal	Practical		Total Mark s	Mar ks	Gra de
1	FSC (4S) Food Quality & Preservation (Theory )	FSC4-T	6			6	4.5		4.5	3 hours	80	20	Interna l	Extern al	100	40	p
2	FSC ( 4S) Practical	FSC4-P			6	6		2.25	2.25	4 Hours			25	25	50	25	p
3	Total		6		6	12	4.5	2.25	6.75	7 hours	80	20	25	25	150	65	P

## Syllabus Prescribed for 2023-2024 UG Programme

**Programme: UG with Food Science**

**Semester-IV**

Code of the Course /Subject	Title of the Course/Subject	Total Number of Periods
<b>FSC4-T</b>	<b>Food Quality &amp; Preservation</b>	<b>90</b>

### COs

After completion of this course the student will able to

- Discuss the reasons of spoilage and quality factors in the food
- Perform sensory evaluation of food products for its quality assessment
- Compare class I and class II types of preservatives
- Justify the advantages of modern food cooking processes over the traditional methods
- Categorize the various heat preservation methods on the basis of their merits and demerits
- Associate the role of various food laws with the quality of food and food products
- Analyze the packaging materials for the labeling and the ingredients

COURSE MODULE	UNIT	CONTENT
<b>DSC</b>	Unit-I Quality factors and spoilage	Quality factors in food (Appearance, Textural, flavor, etc.); Quality assessment methods (sensory, chemical methods, physical and microscopic); Sensory evaluation: Introduction, objectives, type of panels, selection and characteristics of panel members, types of tests; Food spoilage: Definition, causes, factors affecting, types; Common spoilage in basic food stuffs. Food preservation: Introduction, need, principles, methods & classification Food preservation by preservatives: Class I and Class II preservatives with applications <span style="float: right;"><b>(15 Periods)</b></span>
	Unit-II Preservation by low temperature	Preservation by low temperature Refrigerants: Introduction, desirable properties (chemical, physical and general), primary and secondary refrigerants, common refrigerants used in food preservation Refrigeration & freezing: introduction, principle, difference; Types of freezing such as sharp freezing, quick freezing, dehydro-freezing, and freeze drying; Advantages, disadvantages; Food preservation by radiation: ionizing radiation and sources, direct and indirect radiation, effects on food, safety and wholesomeness of irradiated

		food <b>(15 Periods)</b>
	Unit-III Preservation by high temperature	<p>Preservation by high temperature</p> <p>Factors affecting heat resistance of microorganisms</p> <p>Pasteurization: introduction, principle, types (HTST, LTLT, ultra-pasteurization), and application</p> <p>Sterilization: introduction, principle, types (hot, cold, UHT), and application</p> <p>Blanching: introduction, principle, and application</p> <p>Canning: introduction, principle, process, application, and factors affecting the time of sterilization of cans</p> <p>Definitions of the terms TDT (thermal death time), TDP (thermal death point), DRT (decimal reduction time) <b>(15 Periods)</b></p>
	Unit-IV Preservation by water removal	<p>Food preservation by moisture control</p> <p>Drying and dehydration: introduction, principle;</p> <p>Solar drying, Drying by mechanical dryers</p> <p>Types of dryers (air convection dryer, tray dryer, continuous belt dryer, tunnel dryer, fluidized bed dryers, spray dryer, drum dryer, vacuum dryer)</p> <p>Factors affecting drying, treatments before and after drying, effect of drying on food (microbiological, nutritional)</p> <p>Preservation by evaporation &amp; concentration: introduction, principle, equipments and applications, effect on food</p> <p>Food preservation by smoking: theory and application <b>(15 Periods)</b></p>
	Unit-V Food laws and packaging	<p>Food laws and regulations:</p> <p>Prevention of food adulteration (PFA) act: introduction, definition, types of adulteration, various techniques of detection</p> <p>Very short introduction to Essential Commodity Act (ECA): Fruit Product Order (FPO), Vegetable Oil Product Order, Meat Product Control Order, Milk and Milk Product Order (MNPO), etc</p> <p>Bureau of Indian Standards (BIS), Agmark, FAO, WHO</p> <p>Codex: Work of codex, National Codex Contact Point (NCCP) for India, functions and responsibilities</p> <p>Hazard Analysis Critical Control Point (HACCP): risk assessment, risk management, risk communication, principles, need, benefits</p> <p>Packaging; Importance, functions, types, packaging materials</p> <p>Food labeling: Importance, definitions, principle, categories, mandatory requirements in labeling; labeling laws. <b>(15 Periods)</b></p>
<b>SEM</b>	Skills in food quality and preservation	<p>a. Sensory evaluation of food and food products</p> <p>b. Demonstration of relation between freezing and shelf life of food</p> <p>c. Difference between pasteurization, sterilization and blanching by performing the processes</p>

		<p>d. Drying and dehydration of fruits and vegetables</p> <p>e. Categorization of food products by observing the packaging and labeling</p> <p style="text-align: right;"><b>(15 Periods)</b></p>
	<p>COs:</p> <p>By the end of this module, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Criticize the food products for its quality by using sensory evaluation</li> <li>2. Compare the various heat preservation methods</li> <li>3. Perform the processes such as drying, freezing, heating</li> <li>4. Predict the quality of food products by observing the packaging and labeling</li> </ol>	
	<p><b>**Activities</b></p> <ol style="list-style-type: none"> <li>1. Class test(10M)</li> <li>2. Assignment(5M)</li> <li>3. Visit to Food Industry or Laboratory/Group discussion /Seminars and projects/Any innovative activity (5M).</li> </ol>	



## Syllabus Prescribed for 2023-2024 UG Programme

**Programme: UG with Food Science**

**Semester-IV**

<b>Code of the Course /Subject</b>	<b>Title of the Course/Subject</b>	<b>Total Number of Periods</b>
<b>FSC4-P</b>	<b>FSC-(4S) Practical</b>	<b>6 periods /per week/per batch</b>

**COs:**

By the end of this module, the students will be able to:

1. Apply food preservation knowledge for the preservation of food products
2. Evaluate the quality of the food product by the method of sensory evaluation
3. Apply the right method for the preservation of particular food commodity
4. Determine the shelf life of food product
5. Incorporate the methods to find out the adulteration in the food products
6. Compare the various methods of food preservation with their advantages and disadvantages
7. Summarize the quality of market food products by reading the food packet labeling

**Practical: 4S Food Science**

**List of Practical/Laboratory Experiments.**

1. Determination of drying rate of the food stuff
2. Determination of rehydration ratio
3. Study of sensory evaluation technique
4. Sensory evaluation of some food products
5. Determination of shelf life of some food products
6. Study of the use of class II preservatives
7. Study of preservation of food by refrigeration and freezing
8. Study of process of pasteurization of some liquid food
9. Study of process of sterilization of some liquid food
10. Study of process of blanching
11. Detection of adulteration in some basic market food
12. Study of food labeling

**The distribution of marks for the practical examination shall be as follows:**

External Examination		Internal Examination	
Performance of any two experiments	20 Marks	Attendance & students performance	10 Marks
Viva-voce	05 Marks	Practical Record book	10 Marks
		Viva-voce	05 Marks
<b>Total</b>	<b>25 Marks</b>	<b>Total</b>	<b>25 Marks</b>

**Course Material/Learning Resources**

1. Preservation of Fruits and Vegetables by Girdhari Lal
2. Food Additives by Mahindra S.N.
3. Food safety concept and Reality by Mahindra S. N.
4. Drying and dehydration of Food by Loesecke VWH
5. Handbook of Fruit and Vegetable Products by A S Mahbood
6. Outline of Food Technology by Harry W Von
7. Handbook of Analysis and Control for Fruits and Vegetable Products by Ranganna S
8. Food Science by Potter Norman N
9. Food and Food Production Encyclopedia by Considmem Douglas
10. Food Facts and Principles by Maney S
11. Nutritive value of Indian Food by Gopalan C
12. Fruits and Vegetable Processing : Organisation and Institutions by Bhatti S
13. Chemical Changes in Food During Processing by Richardson T
14. The technology of Food Preservation by Desrosier N
15. Principles and Practices for the Safe Processing of Foods by Shapton D A
16. Food Processing and Preservation by Sivasankar B
17. Food Science by Shilakshmi B
18. Food Science and Nutrition by Roday S
19. Food Science Laboratory Manual by Srilakshni B
20. A First Course in Food Analysis by Sathe A Y
21. Text Book on Food Storage and Preservation by Khader V
22. Quality Food Management Principles and Applications by Crusius V C
23. Essentials of Food and Nutrition, Volume I & II by Swaminathan.