

## Skill Development Course

### CH. CHARAN SINGH UNIVERSITY CAMPUS MEERUT DEPARTMENT OF MICROBIOLOGY

#### Course: B.Sc. Microbiology-CBCS

<b>Programme/Class:</b> Certificate	<b>Year:</b> First	<b>Semester:</b> First
<b>Subject:</b> MICROBIOLOGY(Skill)		
<b>Course Code:</b>	<b>Course Title: FOOD TESTING AND QUALITY CONTROL</b>	
<b>Course Outcomes:</b> The student at the completion of the course will be able to: <ul style="list-style-type: none"> <li>● To understand the history, relevance of food basics.</li> <li>● To learn and understand the food and its functions.</li> <li>● To understand the food from plant sources.</li> <li>● To gain knowledge by processing of food from various plant sources.</li> <li>● To understand the food from animal sources.</li> <li>● To understand the milk and its products.</li> <li>● To learn and understand the types of food.</li> <li>● To enable the students to get sufficient knowledge about food industry.</li> </ul>		
<b>Credits:</b> 4	<b>Core:</b> Compulsory	
<b>Max. Marks:</b> 25+75	<b>Min. Passing marks:</b> as per rules	
Total No. of Lectures-Tutorials-Practical(in hours per week): <b>L-T-P:</b> 4-0-0		
<b>Unit</b>	<b>Topics</b>	<b>Total No. of Lectures/Hours(60)</b>
<b>I</b>	<b>Introduction and history</b> Food chemistry, history, water structure and relations in food components.	<b>8</b>
<b>II</b>	<b>Carbohydrates and Lipids</b> Carbohydrates: monosaccharide, oligosaccharides and polysaccharides, starch and cellulose derivatives as food constituents, sugar and related products nutritional value, lipids: components, food lipids and health, antioxidants.	<b>8</b>
<b>III</b>	<b>Structure and function of Proteins &amp; Vitamins</b> Proteins structure and functions, enzymes structure and functions, vitamins structure, types and functions, minerals and nutritional aspects, vegetables and fruits, bioavailability of nutrients.	<b>8</b>
<b>IV</b>	<b>Food pigments and colors</b> Food oxidants, food pigments, natural and synthetic food colours, flavoring agents, sweeteners, emulsifiers and stabilizers, spices and herbs.	<b>6</b>

<b>V</b>	<b>Food preservatives</b> Food preservatives, organic foods, advantages and disadvantages of organic food, food fortification.	<b>8</b>
<b>VI</b>	<b>Adulteration of food</b> Food adulteration, types of adulteration: intentional adulteration, incidental adulteration.	<b>6</b>
<b>VII</b>	<b>Food laws &amp; standards</b> Food laws, food standardization and regulation agencies in India, national standards, international standards.	<b>8</b>
<b>VIII</b>	<b>Evaluation of food quality</b> Evaluation of food quality, sensory tests, types of tests, objective evaluation and instruments used for texture evaluation.	<b>8</b>

**Suggested Readings:**

1. Voet D and Voet JG. Principle's of Biochemistry. John Wiley and sons New York.
2. Moat AG and Foster J. W. Microbial Physiology. John Wiley and Sons, New York.
3. Willey J, Sherwood L. and Woolverton C. Prescott's Microbiology, McGraw Hil
4. U. Satyanarayan. Biochemistry, Elsevier
5. Robinson Dairy Microbiology.
6. Jay JM Modern Food Microbiology. Van Nostraaand Reinhold Co., New York.
7. Andrew Proctor Alternatives to conventional food processing, RSC pub.
8. Frazer WC and Westhoff DC Food Microbiology. Mcgraw Hill, New York.
9. Srilakshmi B Food Science, New Age Publication.

**Course prerequisites:** To study this course, a student must have had the subject biology in class 12<sup>th</sup>.

**Suggested Continuous Evaluation Methods:**

**House Examination/Test:** 10 marks

**Written Assignment/Presentation/Project/Research Orientation/Term papers/Seminar:** 10 Marks

**Class performance/Participate:** 5 Marks

**Further Suggestions:** None

**CH. CHARAN SINGH UNIVERSITY CAMPUS MEERUT**  
**DEPARTMENT OF MICROBIOLOGY**  
**Course: B.Sc. Microbiology-CBCS**

<b>Program/ Class:</b> Certificate	<b>Year:</b> First	<b>Semester:</b> Second
<b>Subject:</b> Microbiology (Skill course)		
<b>Course code:</b>	<b>Course Title:</b> Computer Application and Bioinformatics	
<b>Course Outcomes:</b> The student at the completion will be able to –		
<ul style="list-style-type: none"> <li>• Adjust to protocols and guidelines relevant to the assistant role in computational and bioinformatics practices/techniques.</li> <li>• Recognize the boundary of the bioinformatician responsibility</li> <li>• Exhibit managing potential to the quality and safety</li> <li>• Be aware of relevant legislation, standard, policies and procedures followed in the lab</li> <li>• Practical and internship on all units with skill partners.</li> </ul>		
<b>Credit:</b> 3		<b>Course:</b> skill
<b>Maximum Marks:</b> 25+75		<b>Min. Passing Marks:</b> as per rules
Total No. of Lectures-Tutorials-Practical (in hours per week) <b>L-T-P:</b> 1-0-2		
Unit	Topics	Total No. of Lectures (15T+60P)
<b>I</b>	<b>Introduction to computers:</b> <ul style="list-style-type: none"> <li>• Components, Classifications, Generations of computer</li> <li>• Internal representation of data (binary, octal and hexa-decimal system, bits and bytes)</li> <li>• Operating system- Disc operating systems (DOS), UNIX/Linux, WINDOWS and its upgraded versions; Mobile operating system</li> </ul>	<b>3T+6P</b>
<b>II</b>	<b>Introduction to networking:</b> <ul style="list-style-type: none"> <li>• Types of Networking (LAN: local area network, WAN: wide area network, MAN: metropolitan area network)</li> <li>• Client-Server Architecture</li> <li>• Network topologies and Internet</li> </ul>	<b>2T+6P</b>
<b>III</b>	<b>Microsoft (MS) office and its applications:</b> <ul style="list-style-type: none"> <li>• MS Excel and its applications for statistical analyses with particular reference to agricultural data (tabular and graphical representation of data, analyses of variance, regression and correlation)</li> <li>• MS Word and its application for document preparation</li> <li>• MS Power Point and its application for preparing presentations</li> </ul>	<b>3T+12P</b>

<b>IV</b>	<b>An overview of bioinformatics:</b> <ul style="list-style-type: none"> <li>• Definition and scope of bioinformatics, kind of data used in bioinformatics</li> <li>• Biological databases (nucleic acid, protein sequence and protein structure database); multiplicity of data and redundancy</li> <li>• Bioinformatics websites; PubMed and other databases; on-line access to abstracts and full text of articles; online books; free and paid access</li> </ul>	<b>4T+12P</b>
<b>V</b>	<b>Sequence analysis:</b> <ul style="list-style-type: none"> <li>• Sequence Alignment, Introduction to sequence analysis, Sequence database similarity searching algorithms, local alignment, global alignment</li> <li>• FASTA, BLAST (BLASTP, BLASTN, BLASTX, TBLASTN, TBLASTX) and similarity searching scores.</li> </ul>	<b>3T+24P</b>
<b>Suggested Readings:</b> <ol style="list-style-type: none"> <li>1. Gear, CW (1980). Computer Organization and Programming. McGraw-Hill Inc., New York.</li> <li>2. Gotefried, B.S. (1986). Theories and Problems of Programming with BASIC. Schaum's Outline Series, McGraw-Hill Book Company, Singapore.</li> <li>3. Lipschutz, M.M and Lipschutz, S. (1981). Theories and Problems of Data Processing. Schaum's Outline Series, McGraw-Hill Book Company, Singapore.</li> <li>4. Subramanian, N. (1986). Introduction to Computer. Fundamentals of Computer Science. Tata McGraw-Hill Publishing Company Ltd., New Delhi.</li> <li>5. Rajaraman, V. Fundamentals of Computers. Prentice-Hall of India (Pvt.) Ltd., New Delhi.</li> <li>6. Mount, D.W. (2004). <b>Bioinformatics: Sequence and Genome Analysis, 2/e.</b> Cold Spring Harbor laboratory Press, USA.</li> <li>7. Rastogi, S.C., Mendiratta, N. and Rastogi, P. (2003). Bioinformatics: Concepts, Skills and Applications. CBS Publishers, New Delhi.</li> </ol>		
<b>Course Prerequisites:</b> To study this course, a student must have had the subject biology in class 12 <sup>th</sup> .		

**CH. CHARAN SINGH UNIVERSITY CAMPUS MEERUT**  
**DEPARTMENT OF MICROBIOLOGY**  
**Course: B.Sc. Microbiology-CBCS**

<b>Program/ Class:</b> Diploma	<b>Year:</b> Second	<b>Semester:</b> Third
<b>Subject:</b> Microbiology (Skill course)		
<b>Course code:</b>	<b>Course Title:</b> Nutritional Therapy	
<b>Course Outcomes:</b> The student at the completion will be able to –		
<ul style="list-style-type: none"> <li>• Adjust to protocols and guidelines relevant to the assistant role in nutritional therapy practices/techniques.</li> <li>• Recognize the boundary of the nutritional therapist responsibility.</li> <li>• Exhibit managing potential to the quality and safety.</li> <li>• Be aware of relevant legislation, standard, policies and procedures followed in the lab</li> <li>• Practical and internship on all units with skill partners.</li> </ul>		
<b>Credit:</b> 3		<b>Course:</b> skill
<b>Maximum Marks:</b> 25+75		<b>Min. Passing Marks:</b> as per rules
Total No. of Lectures-Tutorials-Practical (in hours per week) <b>L-T-P:</b> 1-0-2		
<b>Unit</b>	<b>Topics</b>	<b>Total No. of Lectures (15T+60P)</b>
<b>I</b>	<b>Introduction to Nutrition:</b> <ul style="list-style-type: none"> <li>• Sources of Nutrition, Nutritional requirements of a healthy person.</li> <li>• Therapeutic nutrition, Nutritional supplements, artificial nutrition, Enteral Nutrition, Parenteral Nutrition.</li> <li>• Functional foods, types of functional foods, Nutraceuticals</li> </ul>	<b>3T+6P</b>
<b>II</b>	<b>Introduction to Therapeutic nutrition:</b> <ul style="list-style-type: none"> <li>• Use of Therapeutic nutrition in Nausea, Vomiting, Swallowing problems, Weight loss and related problems.</li> <li>• Allergies, Food allergies, Diagnosis and intolerance, Dietary management of food allergies, Pea nut allergy, Cow milk allergy. Digestive disorders and diets</li> </ul>	<b>2T+6P</b>
<b>III</b>	<b>Therapeutic nutrition and management:</b> <ul style="list-style-type: none"> <li>• Diabetes, types of diabetes, complications associated with diabetes, Therapeutic nutrition and management of diabetes.</li> <li>• dietary fat and cholesterol, Renal/kidney conditions, kidney stones, eating the right amount of energy</li> </ul>	<b>3T+12P</b>

<b>IV</b>	<b>An overview of metabolic conditions:</b> <ul style="list-style-type: none"> <li>• Cancer, dietary factors associated with cancer, therapy and nutrition.</li> <li>• nutritional side effects and dietary management.</li> <li>• metabolic conditions of liver; Hepatitis, Cirrhosis, Gallbladder</li> </ul>	<b>4T+12P</b>
<b>V</b>	<b>Food for man:</b> <ul style="list-style-type: none"> <li>• Food for man: use of microbes and microbial enzymes in the improvement of nutritive quality of food.</li> <li>• Probiotics and Prebiotics.</li> <li>• Microbiological criteria for food, Fruit juices, Food control.</li> </ul>	<b>3T+24P</b>
<p><b>Suggested Readings:</b></p> <ol style="list-style-type: none"> <li>1. Adams M. R. &amp; Moss M. O. Food Microbiology, Royal Society of Chemistry Publication, Cambridge.Pergamon Press.</li> <li>2. Hobbs B. C. &amp; Roberts D. Food poisoning and Food Hygiene, Edward Arnold (A division of Hodder and Stoughton London).</li> <li>3. Robinson R. K. Dairy Microbiology, Elsevier Applied Sciences, London.</li> <li>4. Jones, S., Quinn S., Textbook of Functional Medicine.</li> <li>5. Jonathan V. Wright (latest Edition) Dr Wright's book of nutritional therapy</li> <li>6. William C Frazier, Food Microbiology, McGraw Hill.</li> </ol>		
<p><b>Course Prerequisites:</b> To study this course, a student must have had the subject biology in class 12<sup>th</sup>.</p>		

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**Course: B.Sc. Microbiology-CBCS**

<b>Program/ Class:</b> Diploma	<b>Year:</b> Second	<b>Semester:</b> Fourth
<b>Subject:</b> Microbiology (Skill course)		
<b>Course code:</b>	<b>Course Title: Food Processing, Preservation and Packaging</b>	
<b>Course Outcomes:</b> The student at the completion will be able to – <ul style="list-style-type: none"> <li>• Adjust to protocols and guidelines relevant to the assistant role in Food Processing, Preservation and Packaging /Techniques</li> <li>• Recognize the boundary of the Food Processing, Preservation and Packaging responsibility.</li> <li>• Exhibit managing potential to the quality and safety.</li> <li>• Be aware of relevant legislation, standard, policies and procedures followed in the lab Practical and internship on all units with skill partners</li> </ul>		
<b>Credit: 3</b>		<b>Course: skill</b>
<b>Maximum Marks: 25+75</b>		<b>Min. Passing Marks: as per rules</b>
Total No. of Lectures-Tutorials-Practical (in hours per week) <b>L-T-P: 1-0-2</b>		
Unit	Topics	Total No. of Lectures (15T+60P)
<b>I</b>	<ul style="list-style-type: none"> <li>• Introduction to food processing, food container manufacturing, food canning, food science and high processing techniques</li> <li>• Shelf life of processed food</li> <li>• Food processing of cereals</li> <li>• Legumes, oil seeds, fruits and vegetables</li> <li>• Dairy products, dairy processing biotechnology, membrane technology in dairy processing and fermentation</li> <li>• Flesh food technology, food additives, extruded food, food radiation.</li> </ul>	<b>3T+6P</b>
<b>II</b>	<ul style="list-style-type: none"> <li>• Introduction to preservation, types of preservation</li> <li>• Natural and artificial preservative agent, class I, II and III preservative agents</li> <li>• Methods of preservation, thermal process, Vacuum drying and dehydration, cooking and freezing</li> <li>• Food preservation by chemicals, minimal processing of fresh foods,</li> </ul>	<b>2T+6P</b>
<b>III</b>	<ul style="list-style-type: none"> <li>• Emerging techniques in food processing</li> </ul>	<b>3T+12P</b>

	<ul style="list-style-type: none"> <li>• Modified atmosphere packaging, genetic engineering.</li> </ul>	
<b>IV</b>	<ul style="list-style-type: none"> <li>• Emerging technologies for minimally processed fresh fruit juices</li> <li>• Pulse electric field, high hydrostatic pressure</li> </ul>	<b>4T+12P</b>
<b>V</b>	<ul style="list-style-type: none"> <li>• Environmental aspects of food processing technology</li> <li>• Food packaging wastes and its environmental aspects environmental impact on packaging,</li> <li>• Food processing industry, safety in food processing,</li> </ul>	<b>3T+24P</b>
<p><b>Suggested Readings:</b></p> <ol style="list-style-type: none"> <li>1. . J. Scott Smith and Y.H. Hui., Food processing principles and applications. Blackwell publishing</li> <li>2. B.S. Khatkar, Food Science and technology,Daya publishing house Delhi</li> <li>3. Martin R Adams and Maurice O Moss Food Microbiology. The Royal Society of Chemistry. Cambridge UK</li> <li>4. William C frazier, Dennis C Westhoff. Food microbiology. McGraw Hill Education private Limited New Delhi</li> </ol>		
<p><b>Course Prerequisites:</b> To study this course, a student must have had the subject biology in class 12<sup>th</sup>.</p>		



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**DEPARTMENT OF MICROBIOLOGY**  
**Course: B.Sc. Microbiology-CBCS**

<b>Programme/Class:</b> Certificate	<b>Year:</b> Second	<b>Semester:</b> Third/Fourth
<b>Subject:</b> MICROBIOLOGY		
<b>Course Code:</b>	<b>Course Title:</b> FOOD AND FOOD SOURCES	
<b>Course Outcomes:</b> The student at the completion of the course will be able to: <ul style="list-style-type: none"> <li>● To understand the history, relevance of food basics.</li> <li>● To learn and understand the food and its functions.</li> <li>● To understand the food from plant sources.</li> <li>● To gain knowledge by processing of food from various plant sources.</li> <li>● To understand the food from animal sources.</li> <li>● To understand the milk and its products.</li> <li>● To learn and understand the types of food.</li> <li>● To enable the students to get sufficient knowledge about food industry.</li> </ul>		
<b>Credits:</b> 4		<b>Core:</b> Compulsory
<b>Max. Marks:</b> 25+75		<b>Min. Passing marks:</b> as per rules
Total No. of Lectures-Tutorials-Practical(in hours per week): <b>L-T-P:</b> 4-0-0		
<b>Unit</b>	<b>Topics</b>	<b>Total No. of Lectures/Hours(60)</b>
<b>I</b>	<b>Introduction</b> Food basics, food groups, food chain, food texture, food intake and its regulation	<b>8</b>
<b>II</b>	<b>food and its functions</b> food and its functions as physiological, body buildings, psychological and social functions, food pattern, food consummation trends, population growth and food production.	<b>8</b>
<b>III</b>	<b>Food from plant sources</b> Food from plant sources, food grains, cereals and cereal products, composition of cereals, pulses and their nutritional value,	<b>8</b>
<b>IV</b>	<b>Processing of plant sources</b> Processing of pulses, nuts and oilseeds, processing of oilseeds, other horticulture crops, post harvest processing of food crops.	<b>6</b>
<b>V</b>	<b>Food from animal sources</b> Food from animal sources, meat and meat products, live stocks poultry and meat production, wholesome of meat production, processed meats, egg and egg products	<b>8</b>
<b>VI</b>	<b>Milk and milk products</b> Milk and milk products, dairy byproducts, fish and	<b>6</b>

	fishery products.	
<b>VII</b>	<b>Types of foods</b> Organic foods, genetically modified food, energy drinks, stimulating drinks, carbonated non alcoholic beverages/soft drinks, comfort foods, infants foods, nutraceuticals, ayurvedic medicinal foods, food taboos.	<b>8</b>
<b>VIII</b>	<b>Food industry</b> Food industry, components and characteristics of the food industry, allied industries, international activities of food industry, processing and value addition, food trade, national food processing policy, food safety.	<b>8</b>

**Suggested Readings:**

- 1 Nelson D and Cox MM., Lehninger's Principles of Biochemistry. W.H. Freeman and Company.
- 2 Voet D and Voet JG., Principle's of Biochemistry. John Wiley and sons New York.
- 3 Stryer. L. Biochemistry. W. H. Freeman and Co.
- 4 Willey J, Sherwood L. and Woolverton C. Prescott's Microbiology.
- 5 U. Satyanarayan Biochemistry, Elsevier
- 6 Andrew Proctor Alternatives to conventional food processing, RSC pub.
- 7 Frazer WC and Westhoff DC. Food Microbiology. Mcgraw Hill, New York.
- 8 B.D. Singh. Biotechnology, Kalyani Publication.
- 9 Srilakshmi B Food Science, New Age Publication.

**Course prerequisites:** To study this course, a student must have had the subject biology in class 12<sup>th</sup>.

**Suggested Continuous Evaluation Methods:**

**House Examination/Test:** 10 marks

**Written Assignment/Presentation/Project/Research Orientation/Term papers/Seminar:** 10 Marks

**Class performance/Participate:** 5 Marks

**Further Suggestions:** None

**CH. CHARAN SINGH UNIVERSITY CAMPUS MEERUT**  
**DEPARTMENT OF MICROBIOLOGY**  
**Course: B.Sc. Microbiology-CBCS**

<b>Program/ Class:</b> Certificate	<b>Year:</b> First	<b>Semester:</b> First/Second
<b>Subject:</b> Microbiology (Minor)		
<b>Course code:</b>	<b>Course Title: Public Health and Hygiene</b>	
<b>Course Outcomes:</b> The student at the completion will be able to –		
<ul style="list-style-type: none"> <li>• Adjust to protocols and guidelines relevant to the assistant role in public health and hygiene practices/techniques.</li> <li>• Recognize the boundary of the public health and hygiene responsibility.</li> <li>• Exhibit managing potential to the quality and safety.</li> <li>• Be aware of relevant legislation, standard, policies and procedures followed in the lab</li> <li>• Practical and internship on all units with skill partners.</li> </ul>		
<b>Credit:</b> 3		<b>Course:</b> skill
<b>Maximum Marks:</b> 25+75		<b>Min. Passing Marks:</b> as per rules
Total No. of Lectures-Tutorials-Practical (in hours per week) <b>L-T-P:</b> 1-0-2		
Unit	Topics	Total No. of Lectures (15T+60P)
<b>I</b>	<b>Introduction to Public Health and Hygiene:</b> <ul style="list-style-type: none"> <li>• Introduction to Public Health and Hygiene, Relationship between health and hygiene.</li> <li>• Physical fitness of human body and WHO definition of health. Washing habits and hygiene.</li> <li>• Factors affecting public health. Community health and medicine.</li> </ul>	<b>3T+12P</b>
<b>II</b>	<b>Personal health and balanced diet:</b> <ul style="list-style-type: none"> <li>• Personal health and balanced diet, Food safety quality control and hygiene, Personal and Domestic hygiene, clean food and water, Ill effects of addictive substances.</li> <li>• Yoga the way of living and regular exercise</li> </ul>	<b>4T+18P</b>
<b>III</b>	<b>Public health and balanced diet:</b> <ul style="list-style-type: none"> <li>• Public Health and nutrition. Classification and Nutritional profiles of various foods and drinks.</li> <li>• Balanced diet, nutritional problems, Demography and family planning.</li> </ul>	<b>4T+12P</b>
<b>IV</b>	<b>An overview of metabolic conditions:</b> <ul style="list-style-type: none"> <li>• Epidemiology and history of epidemiological diseases in India. Route of transmission of disease.</li> </ul>	<b>4T+18P</b>

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|  | <ul style="list-style-type: none"> <li>• Communicable and non communicable diseases. Common community diseases like - Chickengunya, Dengue, Malaria, Cholera, Tuberculosis, HIV/AIDS,</li> <li>• Hepatitis: their prevention and control.</li> </ul> |  |
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**Suggested Readings:**

1. K.D. Chanergy, (2015), Parasitology, CBS Publishers.
2. Andrew Proctor (2011), Alternatives to conventional food processing, RSC Pub.
3. Willey J. Sherwood L.&WoolvertonC (2014) ,Prescott's Microbiology, 9<sup>th</sup> edition McGrawHill,
4. Cathal Kearney (latest edition), Food Hygiene for Food Handlers, Environmental Health Officers's Associaon.
5. C.RayAshfahl and David W Rieske (2009), Industrial safety and health management.
6. Shashi Goyal and Pooja Gupta (2012). Food, Nutrition and Health. S. Chand & Company Ltd.

**Course Prerequisites:** To study this course, a student must have had the subject biology in class 12<sup>th</sup>.