



Republic of the Philippines
SULTAN KUDARAT STATE UNIVERSITY
 Isulan Campus, Isulan Sultan Kudarat
 College of Industrial Technology



FICT 112- FOOD MICROBIOLOGY

UNIVERSITY VISION

A leading University in advancing scholarly innovation, multi-cultural convergence, and responsive public service in a borderless Region.

UNIVERSITY MISSION

The University shall primarily provide advanced instruction and professional training in science and technology, agriculture, fisheries, education and other related fields of study. It shall also undertake research and extension services, and provide progressive leadership in its areas of specialization.

UNIVERSITY STRATEGIC GOALS

- Deliver quality service to stakeholders to address current and future needs in instruction, research, extension, and production
- Observe strict implementation of the laws as well as the policies and regulations of the University
- Acquire with urgency state-of-the-art resources for its service areas
- Bolster the relationship of the University with its local and international customers and partners
- Leverage the qualifications and competences in personnel action and staffing
- Evaluate the efficiency and responsiveness of the University systems and processes

INSTITUTIONAL OUTCOMES (IO)

- Enhance competency development, commitment, professionalism, unity and true spirit of service for public accountability, transparency and delivery of quality services
- Provide relevant programs and professional trainings that will respond to the development needs of the region
- Strengthen local and international collaborations and partnerships for borderless programs
- Develop a research culture among faculty and students
- Develop and promote environmentally-sound and market-driven knowledge and technologies at par with international standards
- Promote research-based information and technologies for sustainable development
- Enhance resource generation and mobilization to sustain financial viability of the university

PROGRAM OUTCOMES (PO) COMMON TO ALL PROGRAMS AND ITS RELATIONSHIPS TO INSTITUTIONAL OUTCOMES

	INSTITUTIONAL OUTCOMES (IO)						
	a	b	c	d	e	f	g
A graduate of the BlndTech program can:							
a. Analyze broadly defined industrial technology processes by using analytical tools that enhance creativity, innovativeness, and intellectual curiosity to improve methods, processes, and systems that meet the industry standards;	✓	✓				✓	
b. Design and implement broadly defined industrial systems, components, products, or processes to meet specific industry needs with proficiency and flexibility in the area of specialization in accordance with global standards;	✓	✓		✓		✓	
c. Apply appropriate techniques, resources, and state-of-the-art industrial technology tools to meet current industry needs and use these modern tools and processes to improve and increase entrepreneurial activities upholding the safety and health standards of business and industry;	✓		✓	✓	✓		

d. Communicate with diverse groups of clienteles the appropriate cultural language with clarity and persuasion, in both oral and written forms, including understanding and giving of clear instructions, high comprehension level, effectiveness in delivering presentations and writing documents, and articulating technological innovation outputs;	✓	✓	✓	✓	✓		
e. Develop leadership and management skills in a team-based environment by making informed decisions, keeping the team motivated, acting and delegating responsibility, and inspiring positive changes in the organization by exercising responsibility with integrity and accountability in the practice of one's profession;	✓	✓	✓	✓	✓		
f. Practice the moral responsibilities of an industrial technologist to manage and balance wider public interest and uphold the norms and safety standards of the industrial technology profession;				✓	✓	✓	✓
g. Demonstrate enthusiasm and passion for continuous personal and professional development in broadly defined industrial technology and effecting positive changes in the entrepreneurial and industrial endeavor; and	✓	✓	✓	✓	✓	✓	✓
h. Recognize the need for, and an ability to engage in lifelong learning.	✓	✓	✓	✓	✓	✓	✓

1 COURSE CODE FICT 112
2 COURSE TITLE Food Microbiology
3 PREREQUISITE None
4 CREDITS 3 units

5 COURSE DESCRIPTION

This course provides a comprehensive overview of the role of microorganisms in food systems, emphasizing their relevance in both food spoilage and food production. It covers microbial flora in raw and processed foods, classification and behavior of food-relevant microbes, and the dynamics of beneficial organisms in fermentation processes. Students will explore traditional and commercial fermentation practices (e.g., cheese, yogurt, coffee, cacao, wine, vinegar), food preservation, and the use of probiotics. The course integrates laboratory-based activities, product development, and microbiological testing techniques with safety and regulatory standards relevant to the food industry.

6 COURSE LEARNING OUTCOMES (CLO) AND ITS RELATIONSHIPS TO PROGRAM OUTCOMES		Program Outcomes						
Course Learning Outcomes (CLO)		a	b	c	d	e	f	g
At the end of the course, a student can:		✓	✓	✓	✓	✓	✓	✓
a. Understand SKSU-VGMO, Classroom Policies, Course Overview, Course Requirements and Grading System;		✓	✓	✓	✓	✓	✓	✓
b. Describe the microbial flora associated with various food commodities and assess their significance in food quality and safety;		✓	✓	✓	✓	✓	✓	✓
c. Classify and compare the morphology and behavior of bacteria, yeasts, molds, and viruses relevant to food systems;		✓	✓	✓	✓	✓	✓	✓
d. Differentiate beneficial from harmful microorganisms in food, including their roles in fermentation and spoilage;		✓	✓	✓	✓	✓	✓	✓
e. Apply microbiological principles in the preparation and assessment of fermented food products, including indigenous and commercial systems;		✓	✓	✓	✓	✓	✓	✓
f. Practice food safety and hygiene protocols in handling, processing, and storing food to prevent contamination and spoilage; and		✓	✓	✓	✓	✓	✓	✓
g. Demonstrate a commitment to continuous learning and innovation in food microbiology applications within the food industry.		✓	✓	✓	✓	✓	✓	✓

7 COURSE CONTENTS

WEEK	CONTENT	INTENDED LEARNING OUTCOMES(ILOs)	TEACHING AND LEARNING ACTIVITIES (TLA)	OUTCOMES-BASED ASSESSMENT (OBA)	COURSE LEARNING OUTCOME S (CLOs)

1	Course Orientation SKSU VMGO, Classroom Policies, Course Overview, Course Requirements, Grading System	At the end of the week, the student can: a. Discuss the University's VMGO, classroom policies, course overview, requirements and grading system	Discuss the VMGO of the University, the classroom policies, scope of the course, course requirements and grading system	a. Participation in discussions	a, b, c, d, e, f, g
2-4	Chapter 1 Microbial Flora of Significance in Food Systems Lesson 1: Foods and their Microbial Flora <ul style="list-style-type: none"> 1.1 Raw and Ready-To-Eat Meat Products 1.2 Raw and Pasteurized Milk 1.3 Eggs and Egg Products 1.4 Fish and Shellfish 1.5 Vegetables, Fruits, and Nuts 1.6 Cereal, Starches, and Gums 1.7 Mayonnaise and Salad Dressings 1.8 Spices and Condiments 1.9 Canned Foods 1.10 Sugars and Confectioneries 1.11 Soft Drinks, Fruit and Vegetable Drinks, Juices, and Bottled Water 	At the end of the lesson, the students can: <ul style="list-style-type: none"> • Differentiate between raw and processed food in terms of microbial flora. • List the predominant microorganisms found in common food products. • Explain the sources and effects of microbial contamination in specific food types. • Evaluate the importance of natural flora in food processing and storage. 	Lecture, case studies (per commodity), sample observation (images/videos)	Written quiz, infographic presentation on food commodities and microflora	a, b, f

5-6	Chapter II Behaviors of Natural Flora in Food Lesson 1: Behaviors of Natural Flora in Food 1.1 Taxonomic Classification of Microorganisms Relevant to Food Microbiology 1.2 Nomenclature of Microorganisms 1.3 Morphology and Structure of Microorganisms in Food	At the end of the lesson, the students can: <ul style="list-style-type: none"> • Define and differentiate major groups of microorganisms. • Explain how microorganisms are classified. • Interpret basic microbial naming conventions. • Compare microbial structure. 	Lecture, diagramming activity, taxonomy chart creation	Labeling activity or quiz on morphology and classification	a, b, c, f
7-8	Chapter II Behaviors of Natural Flora in Food Lesson 2: Important Microorganisms in Food 2.1 Molds 2.2 Yeast 2.3 Bacteria 2.4 Viruses	At the end of the lesson, the students can: <ul style="list-style-type: none"> • Identify the major genera of molds, yeasts, bacteria, and viruses found in foods. • Classify microorganisms based on their metabolic products and environmental tolerance. • Explain the beneficial and harmful roles of food microorganisms. • Compare different types of microorganisms in terms of structure and spoilage activity. 	Case discussion, video demo, microscopy images	Multiple choice/short answer test, group reporting	a, b, c, f

9-10	Chapter III Roles of Beneficial Microorganisms in Food Processing Lesson 1: Importance of Microorganisms in Food Industry 1.1 Fermentation: Principles and Applications 1.2 Lactic Acid Bacteria as Starter Cultures 1.3 Yeast in Food Fermentation and Industry 1.4 Molds	At the end of the lesson, the students can: <ul style="list-style-type: none"> Describe the role of microorganisms in the fermentation of food. Explain the functions of bacteria, yeast, and molds in the food industry. Differentiate between beneficial and harmful food microorganisms. Evaluate the safety and regulatory aspects of using microbes in food. Propose ways to utilize beneficial microorganisms in food processing. 	Discussion	Multiple choice/short answer test, group reporting	a, b, c, g
11	MIDTERM EXAM				
12-13	Chapter IV Factors Influencing the Growth of Microorganisms in Food Lesson 1: Intrinsic Factors 1.1 Nutrients and Growth 1.2 Growth Factors and Inhibitors in Food 1.3 Water Activity 1.4 pH 1.5 Redox Potential, Oxygen, and Growth Lesson 2: Extrinsic Factors 2.1 Temperature and Growth	At the end of the lesson, the students can: <ul style="list-style-type: none"> Describe the intrinsic factors of food affecting microbial growth. Explain how intrinsic factors influence microbial metabolism and growth rate. List the extrinsic factors that influence microbial growth in food. Explain the effects of temperature, humidity, and gaseous environment on food spoilage. Apply storage knowledge to identify potential spoilage risks. 	Lecture	Worksheet analysis, short written exam	a, b, c, g

14-15	<p>Chapter V</p> <p>Cheese, Coffee, Cacao, and Beverage Fermentation</p> <p>Lesson 1: Microorganisms involved in fermentation processes</p> <p>1.1 Cottage Cheese 1.2 Coffee Processing 1.3 Cacao fermentation 1.4 Wine 1.5 Vinegar</p>	<p>At the end of the lesson, the students can:</p> <ul style="list-style-type: none"> • Identify the key microorganisms involved in common food fermentation processes. • Describe the step-by-step microbial activities in the fermentation of cheese, coffee, cacao, wine, and vinegar. • Explain how environmental conditions influence microbial behavior in fermentation. • Differentiate between single-species and mixed-species fermentation systems. • Evaluate the significance of microbial end products in the sensory and nutritional quality of fermented foods. 	<p>a. Lab activities b. Lecture and case study discussions.</p>	<p>a. Practical exam b. Quiz b. Lab Report.</p>	a, e, g

16	Chapter VI Fermented Milk Products and Probiotics Lesson 1: Milk Composition, Quality, and Fermentation 1.1 Yogurt Fermentation 1.2. Probiotics	At the end of the lesson, the students can: <ul style="list-style-type: none"> • Identify the major components of cow's milk involved in fermentation. • Explain how milk composition affects microbial growth in fermented dairy products. • Demonstrate proper fermentation procedures for producing yogurt. • Differentiate the functions of lactic acid bacteria used in yogurt fermentation. 	Lab demo, fermentation experiment, peer discussion	Lab report, practical evaluation	a, b, c, g
17	Chapter VII Lactic Acid Fermentation Lesson 1: Indigenous fermentation 1.1 Burong Manga 1.2. Burong Dalag	At the end of the lesson, the students can: <ul style="list-style-type: none"> • Define lactic acid fermentation and identify the key lactic acid bacteria (LAB) involved in the process. • Explain the principles and significance of lactic acid fermentation in food preservation and flavor enhancement. • Prepare fermented food products such as <i>burong mangga</i> and <i>burong dalag</i> following proper food safety and fermentation procedures. • Assess the quality and safety of fermented products based on appearance, odor, acidity, and potential signs of contamination. • Design a simple experimental setup or product innovation using lactic acid fermentation principles with an alternative local ingredient. 	Hands-on food prep, safety checklist activity, product testing	Quiz Lab activity	
18	FINAL EXAMINATION				

Total No. of Hours : 54

8 COURSE REQUIREMENTS AND COURSE POLICIES

Each student is required to:

COURSE REQUIREMENTS

1. submit accomplished assignments, and activities;
2. make a PowerPoint presentation, and a written summary of the assigned report;
3. participate actively in all discussion;
4. discuss an assigned topic to report and participate in class discussions; and
5. pass the major exams (midterm and final)

COURSE POLICIES

Attendance: A student will be marked late if he/she enters the class 5 minutes after start of class period. Any student who comes to class 15 minutes after the scheduled time or always late for three consecutive meetings shall be marked absent.

Missed work or exam: Any student who missed to submit a work assignment or to take a test should consult the concerned instructor for immediate compliance

Cheating and Plagiarism: Any student who committed any form of academic dishonesty (e.g., copy-paste plagiarism) shall be given disciplinary action provided in the SKSU Student's Handbook

Use of Technology: Cell phones should be turned off while the session is in progress. Using laptops, notebook PCs, smart phones, and tablets shall be allowed only when needed. A scientific calculator (e.g. Casio fx-991ES) shall be utilized in solving.

9 GRADING SYSTEM AND RUBRICS FOR GRADING

GRADING SYSTEM

Midterm Grade	
Midterm Examination	50%
Attendance/ Class Participation	5%
Quizzes	5%
Recitation	5%
Activity	20%
Report	15%
TOTAL	100%

Final Term Grade	
Final Term Examination	50%
Attendance/Class Participation	5%
Quizzes	5%
Recitation	5%
Activity	20%
Report	15%
TOTAL	100%

FINAL GRADE	
Midterm Grade	50%
Final Term Grade	50%
TOTAL	100%

Materials used: Laptop, Powerpoint presentations and video clips
Books, Magazines, Online slides, Teacher-made slides and Textbook

References:

1. Adams, M. R., & Moss, M. O. (2008). *Food microbiology* (third edition). Royal society of chemistry.
2. Domingo, C.J. (2025). Food Microbiology. SKSU
3. Húngaro, H. M., Peña, W. E. L., Silva, N. B. M., Carvalho, R. V., Alvarenga, V. O., & Sant'Ana, A. S. (2014). Food Microbiology. In N. K. Van Alfen (Ed.), *Encyclopedia of Agriculture and Food Systems* (pp. 213–231). Academic Press. <https://doi.org/10.1016/B978-0-444-52512-3.00059-0>

4. Jay, J., Loessner, M., & Golden, D. (2005). *Modern Food Microbiology* (7th ed.). Springer Science+Business Media, Inc. <https://link.springer.com/book/10.1007/b100840>
5. Kwaasi, A. A. A. (2003). MICROBIOLOGY | Classification of Microorganisms. In B. Caballero (Ed.), *Encyclopedia of Food Sciences and Nutrition (Second Edition)* (pp. 3877–3885). Academic Press. <https://doi.org/10.1016/B0-12-227055-X/00773-2>
6. Ray, B. (2004). *Fundamental food microbiology* (3. ed). CRC Press.

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