COURSE OUTLINE

SBT 317: FOOD MICROBIOLOGY

Purpose: To give a comprehensive knowledge and understanding on the relevance of microorganisms in food production, processing and storage. This course will emphasize on role of microorganisms in food production and processing; food as growth medium for microorganisms; food bone intoxications and infections and how to prevent them and food spoilage by microorganisms. It will also give detailed knowledge on food preservation, industrial food quality control techniques and determination of food quality for the market.

Course Objectives

1. Determine microbiological quality of appropriate techniques.
2. Determine microbial types involved in spoilage and health hazards and identify the sources
3. Understand basic mechanism of pathogenesis of foodborne microbes.
4. Design corrective procedures to control the spoilage and pathogenic microorganisms in foods and food ingredients
5. Learn rapid methods to isolate and identify pathogens and spoilage bacteria from food.
6. Design effective sanitation procedures to control spoilage and pathogen problems in food processing

Expected Learning Outcome

By the end of the course unit the learner should be able to:

1. To detect food spoilage and identify microorganisms involved in food spoilage.
2. To explain food spoilage microorganisms and their possible sources
3. Explain factors influencing food spoilage.
4. Distinguish between food borne intoxications and infections in humans and how they can be prevented.
5. Detect food spoilage and isolate food spoilage microbes from various food products
6. Explain various food preservation methods.
7. Explain various food products from microorganisms and how they are produced industrially.

COURSE CONTENT

Food spoilage; factors influencing microorganisms in food spoilage; food preservation: refrigeration, moisture control, canning, radiation and chemicals: food borne infections and intoxication: preventing food borne diseases: foods from microorganisms, fermentations(beer, wines and spirits),Other products: Sauerkraut, pickles, vinegar, sour milk products, cheese and egg products, Cereal food products, single cell protein, meat and meat products, Fish and fish products: Poultry, egg and egg products .

Learning & Teaching Methodologies

- Lectures delivered through PowerPoint presentation,
- Class discussions,
- Group discussions and presentations trough PowerPoint presentations,
- Practical (laboratory) lessons,
- Reading Assignments

Instructional Materials and Equipment

- Laptop PC,
- LCD projector and audio equipment(speakers),
- Lecture Notes,
- Papers from peer reviewed journals, Handouts;
- Microbiology Lab with a laminar flow, autoclave and incubators
- Library; Internet
- Field visit to at least one food processing industry

Course Assessment

- Examination - 70%:
- 2 Continuous Assessments – 20%
- Laboratory reports, Individual and group assignments and presentations) - 10%;
- **Total - 100%**

Recommended Text Books

- Fundamentals of food microbiology by Bibek Ray and Arun Bhunia.
- Modern food microbiology sixth edition by James M. Jay
- Selected published papers from peer reviewed journals
- You Tube Videos
- Any other book in the Library

Teaching Schedule

WEEK	LECTURE	TOPIC	SUBTOPIC
1	1	Introduction to the course	• Course objective and general guide lines to the course • Guidelines to laboratory report writing
	2	Food spoilage	• What is food spoilage? • Indicators of food spoilage • Natural decay in foods • Chemistry of food spoilage
2	3	Sources of food contaminating microorganisms and food contamination from these sources can be prevented	• Soil • Air • Water • Sewage
	4		• Plants and plants products • Food ingredients • Equipment's • Food handlers
3	5		• Animal feeds • Animals, birds, fish, shellfish
	6	• HACCP Systems • Introduction on Laboratory practical 1	• Definition of HACCP • How to develop a HACCP for a given food product • Properties of good quality milk • How to assay for the quality of milk?
4	**6**	Factors influencing growth of Microbial organisms in foods	**Intrinsic factors** • pH, • Water activity, • oxidation-reduction potential
	Practical 1	Quality test of raw vs pasteurized milk	• Methylene blue reductase test • Standard plate count • Coliform test

5	7	Factors influencing growth of Microbial organisms in foods	• Nutrient content • Antimicrobial constituents • Biological structures •
	Practical 2	Determination of microbial load in selected foods (Fish, chicken, meat)	Standard plate count on nutrient agar: coliform counts on EMB Agar
6	7	Factors influencing growth of Microbial organisms in foods	**Extrinsic factors** • temperature of storage • relative humidity of environment •
	Practical 3	Determination of microbial load in foods	Sausage, Yoghurt, cheese
7	8	Factors influencing growth of Microbial organisms in foods	• presence and concentration of gases • presence and activities of other micro organisms
	7	**CAT 1**	
8	9 3 ✓	Types of microorganisms in foods	• Bacteria • moulds
	10 ✓		• Yeast, • Protozoa • Viruses
9	10	Food borne infections and intoxications	• Definition of food intoxications and food infections • Exotoxins vs endotoxins • Neurotoxins vs enterotoxins

			• The most common food borne diseases
			  • Campylobacteriosis
			  • Salmonellosis
			  • Botulism

10	**Practical 4**	Determination of microbial load in drinking water	Microbial tests(coliform test on lactose broth, EMB agar and standard plate count) of various water brands from the market and comparing with tap water and Chiromo River

			water
	11	Food borne infections and intoxications (continuation.....) Food borne infections and intoxications	• *Clostridium perfingens* food poisoning • Shigellosis • *Staphylococcus aureus*
11	12		• Moulds (aflatoxins/fumonisins • Protozoa (*Amoeba, Giardia, Cyclospora*)
	13		• Nematodes(*Trichinella*) • Viruses
12	13	Food preservation methods	• Use of heat (pasteurization, canning) • Use of low temperatures (Freezing) • Drying
	14		• Chemicals(propionic acid, benzoic, sulphur dioxide) • Antimicrobials • Flavoring agents • Spices and essential oils
13	15	Food from microorganisms (fermented products **Group presentations-9 groups of 8 students each)**	• Group 1 Beer • Group 2 Red wine • Group 3 Yoghurt
	16		• Group 4 White wine • Group 5 Cheese • Group 6 Meat products
14	17		• Group 7 Bread products • Group 8 Fish products • Group 9 Sauerkraut, pickles and Vinegar
	18	**CAT 2**	
15	**REVISION WEEK**		