

FST- 441 Microbial Genomics for Food Safety 3(3-0)

Educational Objectives

This course will provide the fundamentals of food microbiology and provide an understanding of how microorganisms behave and how to control them. It will raise awareness of the importance of process control, hygiene, and sanitation in the food processing environment. This course provides information how whole-genome sequencing (WGS) methods, are rapidly transforming food safety, specifically through improved outbreak detection.

Course outcome

On the completion of course student will able to learn:

- Describe the principles underpinning microbial genomics in food safety
- Apply the practical analytical skills gained in the basic concepts of bacterial whole genome sequencing data analysis
- Identify and critique the limitations and strengths of methodological approaches used in bioinformatic research papers
- Integrate bioinformatic workflows into the analysis of research datasets
- Communicate the findings from bioinformatic analyses to audiences with varying domain knowledge
- Consult on and guide the experimental design of future research projects

Theory:

- Introduction: Advances in microbial genomics,
- high-throughput sequencing technologies, genome sequencing statistics. pathogens in food, animal, and humans.
- Beneficial and pathogenic pathogens genomes dynamics.
- Antibiotic resistance and dissemination.
- Genome databases, tools for whole-genome analysis, phylogenomic of microbial species, methods to study the evolution,
- genetic exchanges, and horizontal gene transfer mechanism in microbial species.
- Genome-based diagnostics and therapeutic candidates' identifications.

Recommended Books:

1. Sequencing Technologies in Microbial Food Safety and Quality By Devarajan Thangardurai, 1st Edition 2021.
2. Genetics and Evolution of Infectious Diseases, Second Edition by Michel Tibayrenc 2017.

3. Applied Genomics of Foodborne Pathogens (Food Microbiology and Food Safety) 1st ed. 2017.
4. Internet resources, databases, and tools (updated one).