

BTC DSC 404P
MOLECULAR DIAGNOSTICS AND BIOSTATISTICS

Contact Hours: 60

Full Marks = 100

Two Experiments are to be performed – one from each part

Course Objective: *The practical is designed to equip students with hands-on skills in various biological and statistical techniques. Students will learn to analyse DNA fragments and detect DNA sequence variations in biological samples. They will also gain practical experience in the Southern blotting technique, antibiotic susceptibility testing, and some immunology techniques. The students will also learn the basic concept of biostatistics, including the use of statistical software. Additionally, students will learn the concept of t-tests, chi-square tests etc.*

Part A: Molecular diagnostics

1. Perform agarose gel electrophoresis for DNA analysis, including DNA fragment separation and size determination.
2. Detecting variation at the DNA sequence level of biological samples using RFLP technique
3. Perform antibiotic susceptibility test using Kirby-Bauer disk diffusion method
4. Perform time-kill curve assay for determining bactericidal activity
5. Perform ELISA to detect specific antigen or antibody in a sample.
6. Analyze antigen-antibody reactions using the Ouchterlony double immunodiffusion technique.

Part B: Biostatistics

1. Understanding MS Office package (MS words, MS excel and MS powerpoint).
2. Use of statistical software (MS Excel and SPSS) to find central tendency.
3. Use of statistical software for graphical representation of data.
4. Perform and interpret t-tests for means comparison.
5. Perform and interpret chi-square tests for independence.
6. Perform and interpret one-way ANOVA for comparing multiple group means.
7. Correlation analysis and interpretation.

Course Outcome: Upon completing these practical exercises, students will have acquired essential laboratory skills in molecular diagnostics. Furthermore, students will develop computer-based skills, including using MS Excel and SPSS for data analysis, graphical representation, hypothesis testing (t-tests, chi-square tests), one-way ANOVA, and correlation analysis. These practical skills will enable students to engage in scientific research and data interpretation effectively.

SUGGESTED READING

1. Leonard Debra G.B. (2016). Molecular Pathology in Clinical Practice (2016). Germany: Springer International Publishing.
2. Charles Strom, Frederick L. Kiechle, Robert M. Nakamura, Wayne W. Grody. (2009). Molecular Diagnostics: Techniques and Applications for the Clinical Laboratory. (2009). Netherlands: Elsevier Science.
3. Alex van Belkum, David H. Persing, Fred C. Tenover, Frederick S. Nolte, Margareta Ieven, Melissa B. Miller, Randall T. Hayden, Yi-Wei Tang. (2020). Molecular Microbiology: Diagnostic Principles and Practice. United States: Wiley.
4. Antonisamy, B., Premkumar, P. S., Christopher, S. (2017). Principles and Practice of Biostatistics. India: Elsevier India.
5. Rosner, B. (2016). Fundamentals of Biostatistics. United States: Cengage Learning.