# Course Syllabus:
# STS3401 - Probability and Statistics I

## Course Information

**Course Name**
Probability and Statistics I

**Course Code**
STS3401

**Credits**
3 (3+0)

**Total Student Learning Hours**
120

**Prerequisite**
MTS3101

## Learning Outcomes

Upon completion of the course, students will be able to:

1. Explain the concepts of probability and appropriate statistical methods. (C4)
2. Solve probability and statistical problems using appropriate methods and systematic calculations. (CTPS, NS)
3. Demonstrate skills in continuously applying probability and statistical concepts. (A3, LL)

## Synopsis

This course covers probability theory and appropriate statistical methods. Probability and statistical problem-solving using appropriate methods are also discussed.

# Course Content

Lecture Hours: 42

Topics: 10

1. **Statistical Concepts** (3 hours)
    - Descriptive and inferential statistics
    - Population and sample
    - Quantitative and qualitative data
    - Discrete and continuous random variables
2. **Data Description** (6 hours)
    - Graphical methods for data description
    - Measures of central tendency
    - Measures of dispersion
    - Coefficient of variation
3. **Probability** (3 hours)
    - Basic definition of probability
    - Counting techniques
    - Conditional probability, independent events, and Bayes' Theorem
4. **Discrete and Continuous Random Variables** (3 hours)
    - Probability density function and cumulative distribution function
    - Expected value
    - Chebyshev's Theorem
5. **Probability Distributions** (3 hours)
    - Bernoulli, binomial, hypergeometric, Poisson, negative binomial, geometric distributions
    - Uniform, normal, and exponential distributions
    - Poisson and normal approximations to binomial
6. **Sampling Distributions** (6 hours)
    - Sample mean
    - Sample proportion
    - Difference between two sample means
    - Difference between two sample proportions
7. **Estimation** (6 hours)

- Confidence interval for a single mean
- Sample size determination and error estimation
- Confidence interval for the difference between two means
- Confidence interval for a single proportion and the difference between two proportions
- Confidence interval for a single variance and the ratio of two variances

8. **Hypothesis Testing** (6 hours)
    - Type I and Type II errors
    - Hypothesis testing for a single mean and the difference between two means
    - Hypothesis testing for a single proportion and the difference between two proportions
    - Hypothesis testing for a single variance and the ratio of two variances
9. **Chi-Square Tests** (3 hours)
    - Categorical data
    - Goodness-of-fit test
    - Test of independence
10. **Regression and Correlation** (3 hours)
    - Simple linear regression and interpretation
    - Correlation coefficient and determination
    - Hypothesis testing for the population correlation coefficient
    - Confidence interval for the slope and hypothesis testing for the slope

# Assessment

The course assessment consists of coursework (60%) and a final examination (40%), with the following breakdown:

| **Assessment Component** | **Percentage** | **Timing** |
|---|---|---|
| Test 1 | 20% | Week 5 (10 November 2025) |
| Test 2 | 20% | Week 11 (29 December 2025) |
| Group Assignment 1 (Pitching Video) | 8% | Week 7 |
| Quiz 1 | 2% | Week 5 (10 November 2025) |
| Quiz 2 | 2% | Week 11 (31 December 2025) |
| Group Assignment 2 (Case Study Written Report) | 8% | Week 12 |
| Final Examination | 40% | End of Semester |

Table 1: Assessment Breakdown for STS3401

# References


1. Baron, M. (2019). *Probability and Statistics for Computer Scientists* (3rd ed.). Boca Raton: Chapman and Hall/CRC.

2. Mary, C. M. (2019). *Probability and Mathematical Statistics: Theory, Applications, and Practice in R*. Oxford: SIAM.

3. Mendenhall, W., & Sincich, T. (2016). *Statistics for Engineering and the Sciences* (6th ed.). Boca Raton: Chapman and Hall/CRC.

4. Ross, S. M. (2020). *Introduction to Probability and Statistics for Engineers and Scientists* (6th ed.). London: Academic Press.

5. Walpole, R. E., Myers, R. H., Myers, S. L., & Ye, K. E. (2016). *Probability and Statistics for Engineers and Scientists* (9th ed.). Hoboken: Pearson.