

# SYLLABUS

## MATH 12022 – Probability and Statistics for Life Sciences

(3 Credit Hours)

**Catalog Information:** Probability and statistics with applications in medical and biological sciences. Prerequisite: MATH 12002 or MATH 12012 or MATH 12021 with a minimum grade of C (2.0).

**Text:** Biostatistics for the Biological and Health Sciences, 5<sup>th</sup> Edition, Marc M Triola, M.D, Mario F. Triola, Addison Wesley.

### Examples and Overview (1 Day)

#### Descriptive Statistics (3 days)

- Frequency distributions, graphs
- Measures of central tendency
- Measures of variability
- Quartiles & percentiles
- Box plots

#### Probability (3 days)

- Elementary combinatorics
- Factorial notation, binomial coefficients
- Probability rules — compound events, multiplication rules
- Conditional probability
- Bayes' rule
- Binomial distributions

### REVIEW AND TEST 1

#### The Normal Distribution (2 days)

- The normal distribution and the central limit theorem
- Assessing normality

#### Sampling Distribution (2 day)

- Random samples
- Sampling from finite populations
- Illustration of central limit theorem
- The normal approximation to binomial

## (MATH 12022 Syllabus, continued)

### Confidence Intervals (2 days)

- Point and interval estimates of population parameters
- Confidence interval estimation for:
  - A mean
  - A population variance
  - A binomial parameter

### REVIEW AND TEST 2

#### Comparison of Two Independent Samples (4 days)

- Confidence interval for population means
- Hypothesis testing: The t-test
- Tests to compare two normal population means
- Planning for adequate power
- The Wilcoxon-Mann Whitney Test

#### Statistical Principles of Design (1 days)

- Observational studies
- Experiments
- Restricted randomization: Blocking and stratification
- Levels of replication

#### Comparison of Paired Samples (1 day)

- The paired-sample t-test and confidence interval
- The paired design
- The sign test

### REVIEW AND TEST 3

#### Analysis of Categorical Data (2 days)

- Chi-square tests for goodness of fit test and independence
- Contingency tables
- Confidence interval for difference between probabilities (binomial proportions)

#### Linear Regression and Correlation (2 days)

- Scatter plots
- Linear models and least squares estimates of parameters
- Confidence interval parameter estimation
- Correlation coefficient and coefficient of determination
- Regression analysis of variance

### REVIEW AND FINAL EXAM