

## MODULE SPECIFICATION

<b>Module Title</b>	Introduction to Statistics
<b>Module Code</b>	MTH 110
<b>Module Credits</b>	5
<b>Pre-requisites (including Year 1)</b>	N/A

### Description

<p><b>Course Overview</b></p> <p>This course provides an introductory study of statistics and probability for students who need a practical and conceptual foundation in working with data. The course emphasizes how data can be organized, summarized, interpreted, and used to support decisions. Students will also develop a beginning understanding of probability models, statistical inference, and relationships between variables.</p> <p><b>Learning Outcomes</b></p> <p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Compute and interpret descriptive statistics for data presented in tables, graphs, and raw form.</li> <li>2. Organize and display data clearly using appropriate statistical summaries.</li> <li>3. Apply foundational probability rules to simple and compound events.</li> <li>4. Explain the law of large numbers and the central limit theorem in statistical reasoning.</li> <li>5. Distinguish between discrete and continuous random variables and work with common probability distributions.</li> <li>6. Use standard distributions such as the normal, t, chi-square, and F distributions in estimation and testing contexts.</li> <li>7. Construct and interpret confidence intervals for selected population parameters.</li> <li>8. Carry out and interpret basic hypothesis tests.</li> <li>9. Identify which hypothesis-testing procedure is appropriate in a given setting.</li> </ol>
<p><b>Method of Teaching and Learning</b></p> <p>This module will be taught using a combination of lectures, tutorials and consultation hours. Learning will also be reinforced by appropriate readings from the course text.</p>
<p><b>Syllabus</b></p> <p>Modules</p> <ol style="list-style-type: none"> <li>1. <b>Module 1 - Introduction to Data</b> <ul style="list-style-type: none"> <li>Types of data</li> <li>Displaying data</li> </ul> </li> </ol>

- Collecting and generating data
- Sampling ideas
- Describing data in context
- 2. Module 2 - Numerical Description of Data**
  - Measures of center
  - Measures of spread
  - Comparing distributions
  - Interpreting summary statistics
- 3. Module 3 - Foundations of Probability**
  - Equally likely outcomes
  - Counting methods and combinatorics
  - Multiplication rules
- 4. Module 4 - Probability Rules and Conditional Probability**
  - Expected value
  - Variance
  - Conditional probability
  - Bayes' theorem
  - Midterm 1
- 5. Module 5 - Random Variables and Discrete Probability Models**
  - Random variables
  - Bernoulli distribution
  - Binomial distribution
  - Hypergeometric distribution
- 6. Module 6 - Additional Probability Distributions and Midterm Review**
  - Poisson distribution
  - Normal distribution
  - Review of major concepts
  - Midterm examination
- 7. Module 7 - Estimation and Confidence Intervals**
  - Sample-based estimation of means and variance
  - Confidence intervals
  - Interpretation of interval estimates
- 8. Module 8 - Hypothesis Testing for Means**
  - Logic of hypothesis testing
  - Tests concerning means
  - Statistical significance and interpretation
  - Midterm 2
- 9. Module 9 - Hypothesis Testing for Variance and Proportions**
  - Tests involving variance
  - Tests involving proportions
  - Selecting appropriate testing procedures
- 10. Module 10 - Regression Analysis**
  - Curve fitting
  - Least-squares method
  - Interpretation of fitted models
- 11. Module 11 - Correlation**
  - Correlation coefficient
  - Strength and direction of linear association
  - Interpretation and limitations
- 12. Module 12 - Introduction to Nonparametric Methods**
  - Introductory nonparametric tests
  - Situations where distribution-free methods are appropriate

Final Exam
------------

**Assessment**

Assessment Type	% of Final Mark
Midterm Exam 1	25%
Midterm Exam 2	25%
Final Exam	30%
Homework and Quizzes	10%
Course Participation	10%

Range	Letter Grade
90% - 100%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
< 60%	U

**Textbooks**

*Mandatory Textbooks*

Title	Editor/Author	ISBN/Publisher
Modern Elementary Statistics, 12th edition	John E. Freund and Benjamin M. Perles	9780131874398/Pearson

*Optional Textbooks*

Title	Author	ISBN/Publisher
-------	--------	----------------

*Reference Textbooks*

Title	Author	ISBN/Publisher
-------	--------	----------------