MAT 183 – PROBABILITY AND STATISTICS HONORS UPDATED 3/2026

4 credit hours/week – 4 credits BEGINNING FALL 2026

Catalog Description: An introduction to the principles of statistical methods. The course will integrate spreadsheet software to cover such topics as descriptive statistics, correlation, regression, probability, binomial and normal distributions, sampling, elementary hypothesis testing and confidence intervals. This course will also cover ethical issues in statistics. Comprehensive case studies will be covered throughout the semester. An introduction to the use of statistical software to analyze large data sets will be emphasized.

GPA of 3.3 or higher, CCM Honors student or permission of CCM Honors is required to take this course.

Prerequisite: MAT 016 or MAT 060 or MAT 120 or equivalent.

Text: Sullivan, Michael III, *Statistics, Informed Decisions Using Data, Seventh Ed,* Pearson

Supplementary Materials: Murphy, P. & Sullivan, M., *R Technology Guide,* Pearson

Video & Resource Library – *R Tutorial Videos*, Pearson

Calculators are often (not always) permitted for use in mathematics classes. A scientific calculator is the most advanced calculator that you will need for any of your courses. An excellent (and affordable) model is the Texas Instruments TI-30XIIS 2 Line Scientific Calculator.

Graphing calculators are sometimes permitted. However, the TI Nspire is not an acceptable graphing calculator. Only TI 84 models or below are acceptable. Calculators that can solve equations or perform other advanced operations are not allowed. Therefore, no Casio model calculators are allowed. There are also some models of Texas Instrument calculators as well as other brands that will not be allowed due to their capabilities.

Use of a calculator that is not permitted on an exam can lead to issues with academic integrity. If you have a question as to whether or not your calculator is acceptable, you need to ask your professor before your first exam.

Syllabus

Suggested Timeline	Text Chapter	Topics
		See attached notes regarding ethical reasoning and information literacy topics.
1 – 2	1.1 – 1.6	Introduction; Sampling techniques; Design of experiments
3 – 5	2.1 – 2.4	Organization and presentation of qualitative and quantitative data; Distribution Shapes; Misleading graphs
6 – 8	3.1 – 3.5	Measures of central tendency; Measures of dispersion; Grouped data; Five-number summaries, Boxplots
9		Statistical technology (R, MS Excel, Tableau, graphing calculators, other)
10		**Test 1 (Chapters 1 – 3)**
11 – 14	4.1 – 4.3	Descriptive methods in correlation and least-squares regression; Diagnostics on the Least-Squares Regression Line; Contingency tables

15 – 18	5.1 – 5.8	Probability rules; Addition Rule; Multiplication Rule; Conditional Probability; Counting Techniques; Probability experiments and which method to use; Baye's Rule
19		Statistical technology (R, MS Excel, Tableau, graphing calculators, other) Statistical technology project 1 (mandatory, using R, MS Excel, Tableau, other)
20		**Midterm (Chapters 1 – 5)**
21 – 23	6.1 – 6.2	Discrete random variables; Binomial probability distribution; Geometric probability distribution
24 – 27	7.1 – 7.4	Properties and applications of the Normal Distribution; Assessing normality; The Normal Approximation to the Binomial Probability Distribution
28 – 29	8.1 – 8.2	Distribution of the Sample Mean; Distribution of the Sample Proportion
30		Statistical technology (R, MS Excel, Tableau, graphing calculators, other)
31		**Test 2 (Chapters 6 – 8)**
32 – 36	9.1 – 9.5	Confidence interval for estimating a proportion, for estimating a mean (σ is unknown), and for estimating the standard deviation; Margin of error; Bootstrapping
37– 40	10.1 – 10.5	Hypothesis tests for a population proportion, population mean (σ is unknown), and population standard deviation; Type I and II errors, p-values
41 – 43		Statistical technology project 2 (mandatory, using R, MS Excel, Tableau, other) / Presentation of technology project at the Honors Showcase
44		Review for the Final Examination
45		**Final Exam (Chapters 6 – 10)**

Students are expected to adhere to the policies of the County College of Morris. These can be accessed at https://www.ccm.edu/compliance-information/academic-policies/

Statement of Course LEARNING OUTCOMES

- **Distinguish** among different methods of random sampling used for data collection.
- **Compute** measures of descriptive statistics.
- **Construct** confidence intervals for the mean and interpret the results.
- **Conduct** hypothesis tests for the mean and interpret the results when $\sigma\sigma$ is known and unknown.
- **Conduct** hypothesis test and confidence intervals for proportions.
- **Construct and derive** least-squares linear regression equations.
- **Compute** binomial probabilities.
- **Recognize** statistics presented in a misleading manner.
- **Analyze and portray** statistical information in an ethical way.
- **Evaluate and think critically** about statistical information and be able to use the information effectively.
- **Use** technology and statistical software to **explore** and **analyze** data.
- **Use** technology and statistical software to **construct** visual representations of data.
- **Use** multimedia materials to teach and test students' statistical knowledge and skills.