

Course Syllabus
MATH 110 – Introduction to Statistics
3 credits

Prerequisites: Algebra proficiency is required, as demonstrated by successful completion of high school algebra, by completion of a college algebra course, or their equivalent as determined by Portage staff.

Instructor: Matthew Dodd, MS
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Contact Info: Faculty may be contacted through the Portage messaging system

Course web site address: www.portagelearning.com

Course meeting times: MATH 110 is offered continuously

Course Description: A general introduction to mathematical statistics as a tool used in the decision making process. The course text, homework assignments and examinations will emphasize interpretation of data. The framework of the course is designed to develop in the student an understanding of summarized data (ungrouped and grouped) in both descriptive and inferential statistical applications through the use of frequency distributions, measures of central tendency and measures of dispersion; outcome probabilities and the various concepts related to discrete and continuous probability distributions; the concepts surrounding random sampling and interval estimating for populations and large & small samples; classical hypothesis testing and with one-tailed & two-tailed testing; comparisons involving means; regression analysis, and statistical process control methods.

Course Outcomes: As a result of this course experience a student should be able to explain:

- The difference between qualitative and quantitative data, be able to organize the data and present a meaningful overview of the data through the use of frequency distributions, measures of central tendency (i.e. the mean, median and mode) and measures of dispersion (i.e. the variance, standard deviation and coefficient of variation)
- The rules involved in developing outcome probabilities and how to apply the appropriate counting methods in the development of the probabilities of outcomes in an experiment.
- The difference between a discrete probability distribution and a continuous probability distribution.
- The concepts involving random sampling, the sampling distributions of \bar{x} and \bar{p} and other methods.
- The null & alternative hypothesis in classical hypothesis testing along with type I and II errors; one-tailed & two-tailed testing involving populations and both large & small samples.
- Linear regression analysis and lines of best fit.

Each of these MATH 101 student learning outcomes is measured:

Directly by: (1) module application problems (with instructor feedback)

(2) exams

(3) comparison of pre-course / final exam results

Indirectly by an end of course student-completed evaluation survey

Course Delivery: This course is asynchronously delivered online. Contact hours include 40 - 50 hours of reviewed module assignments with instructor feedback. There are 15 additional contact hours composed of secure online exams.

It is the policy for all Portage Learning courses that only one exam be completed each day. Research on best practices in learning psychology indicates that time is needed to process material for optimal learning. This means that once an exam has been completed, the next exam will not unlock until the following day. Please plan your time accordingly. If you have a legitimate need for an exception to this policy, please contact your instructor.

Required Computer Accessories: It is recommended that students use a desktop or laptop computer, PC or Mac, when taking the course. Some tablet computers are compatible with the course, but not all features are available for all tablet computers. The latest full version of Firefox is required for the optimal operation of the Portage Learning Management System.

Required readings, lectures and assignments: Portage courses do not use paper textbooks. Students are required to read the online lesson modules written by the course author which contain the standard information covered in a typical course.

The practice problems within the modules are not quantitatively part of your final grade, but the module work is a pass/fail component of the course and will be reviewed for completeness by the instructor. Be sure to answer all of the problems since this is an important part of adequate preparation for the exams. After you answer the practice problems, compare your answers to the solutions at the end of the module. If your answers do not match those at the end, attempt to figure out why there is a difference. If you have any questions please contact the instructor via the My Messages tab or call the help line at 1-888-724-3590 x2 especially for questions that require long answers or discussion.

Grading Rubric:

| | |
|------------------------------|-----------------|
| Module 1 Exam = 30 pts. | 30 pts. |
| Module 2 Exam = 50 pts. | 50 pts. |
| Module 3 Exam = 50 pts. | 50 pts. |
| Module 4 Exam = 50 pts. | 50 pts. |
| Module 5 Exam = 50 pts. | 50 pts. |
| Module 6 Exam = 50 pts. | 50 pts. |
| Module 7 Exam = 50 pts. | 50 pts. |
| Module 8 Exam = 50 pts. | 50 pts. |
| Module 9 Exam = 35 pts. | 35 pts. |
| Module 10 Exam = 50 pts. | 50 pts. |
| <u>Final exam = 200 pts.</u> | <u>100 pts.</u> |
| Total | 565 pts. |

The current course grade and progress is continuously displayed on the student desktop.

Grading Scale:

| | |
|-------------------------------|-----|
| 89.5% - 100% (506 - 565 pts) | = A |
| 79.5% - 89.4% (450 - 505 pts) | = B |
| 69.5% - 79.4% (393 - 449 pts) | = C |
| 59.5% - 69.4% (337 - 392 pts) | = D |
| <59.4% (<336 pts) | = F |

Modules and Assignments

Module 1: An introduction to data and statistics. This module discusses why statistics are important, and where statistical analysis is used. Students will learn about different types of data that might be used in statistical analysis. Topics covered include: Quantitative and Qualitative Data, Experimental and Observational Studies, Data Errors, Outliers, Descriptive Statistics, Histograms, Populations, and Samples.

Module 2: An introduction to descriptive statistics using tabular, graphical and numerical methods. This module considers ways to describe and represent data. Topics covered include: Frequency Distributions, Relative Frequencies, Charts (Column, Bar, and Pie), Cross-Tabulation, Scatter Diagrams, Measures of Central Tendency, Percentiles, Quartiles, Measures of Dispersion, Z-scores, Bell Curves, and Sample Covariance.

Module 3: An overview of probability. This module considers experiments and the likelihood that an event will occur. Students are taught to calculate probabilities using multiple techniques. Topics

covered include: Probability Distributions, Sample Space, Counting Techniques, Permutations, Combinations, Complements, Union, Intersection, Mutually Exclusive Events, Conditional Probabilities, and Bayes' Theorem.

- Module 4: An introduction to probability distributions. Students will learn about the standard normal probability distribution, and how the data is distributed with respect to the mean. Topics covered include: Random Variables (Discrete and Continuous), Expected Values, Binomial Probability Distributions, Normal Distributions, and The Standard Normal Table.
- Module 5: An overview of sampling and sampling distributions. This module explains how to calculate descriptive statistics when working with a sample instead of the entire population. Topics Covered include: Statistical Inference, Simple Random Samples, Sample Mean, Sample Proportions, The Central Limit Theorem, Sample Error, and Sample Size.
- Module 6: An introduction to interval estimation. In this module students will learn how to take a sample, find its mean, and use this information to estimate the population mean. Students will be able to construct confidence intervals for the population mean. Topics covered include: Confidence Intervals, Confidence Levels, Means, and Proportions.
- Module 7: An introduction to hypothesis testing. In this module students will be guided through the process of hypothesis testing. Students will learn to make assumptions about a certain characteristic of the population and then test to see if the hypothesis is true. Topics covered include: Null Hypothesis, Alternate Hypothesis, One-Tailed and Two-Tailed Tests, Type I and Type 2 errors, and Level of Significance.
- Module 8: An introduction to comparisons involving means and proportions. In this module students will study interval estimation and hypothesis testing for differences between two population means as well as for differences between two population proportions. Topics covered include: Dependent Samples, Independent Samples, Hypothesis Testing Involving Differences between Means, and Hypothesis Testing for Dependent Samples.
- Module 9: An introduction to regression analysis. Students will learn how to calculate the linear correlation coefficient for a set of data to reveal how well two variables are correlated. Students will also learn how to find the best fit line that approximates the relationship between these variables. Topics covered include: Linear Correlation Coefficients, Positive Correlations, Negative Correlations, Critical Values Correlation Coefficient, and Linear Regression

Module 10: An overview of various tests that were not covered in previous modules. Students will learn about goodness of fit tests, tests for independence, and analysis of variance. Topics covered include: Chi-Square Distributions, F Distributions, Multinomial Experiments, Expected Counts, Goodness of Fit Tests, and Tests for Independence.

Holidays:

During the following holidays, all administrative and instructional functions are suspended, including the grading of exams and issuance of transcripts.

New Year's Day

Easter

Memorial Day

Independence Day

Labor Day

Thanksgiving weekend

Christmas Break (one week before Christmas through New Year's Day)

The schedule of holidays for the current calendar year may be found under the Student Services menu at www.portagelearning.com

Additional Tools

A built-in **scientific calculator** for the course has been incorporated into the website and can be found in the tool bar above each module and exam page. If you choose to purchase a calculator, keep in mind that you do not need to purchase an expensive calculator as the features you will need are available on basic scientific calculators with a cost of less than \$20. Many mobile phones also include a scientific calculator and you may use a calculator during any exam.

Suggested Timed Course Schedule (to complete the course within a typical college semester)

All Portage courses are offered asynchronously with no required schedule to better fit the normal routine of adult students, but the schedule below is suggested to allow a student to complete the course within a typical college semester. Despite this suggestion, the students may feel free to complete the course at their desired pace and on a schedule determined by them.

| <u>Time Period</u> | <u>Assignments</u> | <u>Subject Matter</u> |
|---------------------------|---------------------------|--|
| Days 1-10 | Module 1, Exam 1 | Data and Statistics |
| Days 11-20 | Module 2, Exam 2 | Des. Statistics: Tabular / Graphical & Numerical Methods |
| Days 21-30 | Module 3, Exam 3 | Introduction to Probability |
| Days 31-40 | Module 4, Exam 4 | Probability Distributions... Discrete and Continuous |
| Days 41-50 | Module 5, Exam 5 | Sampling and Sampling Distributions |
| Days 51-60 | Module 6, Exam 6 | Interval Estimation |
| Days 61-70 | Module 7, Exam 7 | Hypothesis Testing |
| Days 71-80 | Module 8, Exam 8 | Comparisons Involving Means |
| Days 81-90 | Module 9, Exam 9 | Regression Analysis |
| Days 91-100 | Module 10, Exam 10 | Various Tests |
| Days 101-108 | Final Exam | Comprehensive - including all course material |

Suggested External References:

If the student desires to consult a reference for additional information, the following textbooks are recommended as providing complete treatment of the course subject matter.

John S. Witte, Robert S. Witte, ***Statistics***, Wylie 9th Ed.

Learning Support Services:

Each student should be sure to take advantage of and use the following learning support services which are provided to increase student academic performance:

Messaging system which provides individual instructor/student interaction

Toll-free phone tutoring help line which is available daily at appointed times (see below)

Tech support which is available by submitting a help ticket

Accommodations for Students with Learning Disabilities:

Students with documented learning disabilities may receive accommodations in the form of an extended time limit on exams, when applicable. In order to receive the accommodations, the student should furnish documentation of the learning disability prior to registration, if possible. Upon receipt of the documentation of a learning disability, Portage staff will provide the student with registration instructions for a variation of the course containing exams with extended time limits. This accommodation does not alter the content of any assignments/exams, change what the exam is intended to measure or otherwise impact the outcomes of objectives of the course.

Student Help Line:

Portage students have access to our help-line phone service. The phone service is staffed by instructors who will answer questions regarding material in those courses. Please call 1-888-724-3590 and choose option #2 if you would like assistance with your course work. Due to high call volume, we cannot guarantee that your call can be answered immediately so you may be required to leave a voicemail. The help-line instructors will return the voicemails as soon as possible and within one business day. If the hours above do not fit your personal schedule, please leave a message on the help line voicemail requesting an appointment. In the voicemail, please leave several dates and times convenient for a return call. If a help line representative cannot call you at one of your preferred times, you will be contacted to set up a mutually suitable time. Appointment slots are limited and will be granted as instructor time becomes available and at the discretion of the help line instructor. No appointments will be scheduled for Sunday.

Help Line Hours

Mon - Fri: Noon - 9 PM ET

Sat: 9 AM - 11 AM ET

Sun: Closed

Code of Conduct: Students are expected to conduct themselves in a way that supports learning and teaching and promotes an atmosphere of civility and respect in their interactions with others. Verbal and written aggression, abuse, or misconduct is prohibited and may be grounds for immediate dismissal from the program.

Academic Integrity is a serious matter. In the educational context any dishonesty violates freedom and trust, which are essential for effective learning. Dishonesty limits a student's ability to reach his or her potential. Portage places a high value on honest independent work. In a distance learning situation, we depend on the student's desire to succeed in the program he or she is entering. It is in a student's own best interests not to cheat on an exam, as this would compromise the student's preparation for future work. It is required of each student to take exams without consulting course materials or study aids including another person, the lesson pages, printed materials, or the Internet. To this end, your instructor will be alert to any indications that a student may be violating this principle. It will be necessary to show all your work on exams. When the nature of the course does not require numerical or symbolic determination (perhaps instead just requires recitation of learned descriptions), our experienced staff is able to detect the unauthorized consultation of study aids when answering exam questions. A violation of the academic integrity policy may result in a score of zero on the exam and possible expulsion from the course, at the discretion of the instructor with consultation with an administrative-instructional committee.

Grievances: If for any reason a student has a complaint about the course work or the instructor, the student is advised to first consult the instructor, who will be willing to listen and consider your concern. However, if you don't feel you have received a satisfactory reply, you are encouraged to contact the Executive Director of Portage Learning for further consideration of your complaint. The formal grievances process must be initiated via written communication. If desired, please file a written grievance to academics@portagelearning.com to initiate the process.

Remediation:

At Portage Learning we allow a "one-time" only opportunity to re-take an alternate version of **one** module exam on which a student has earned a grade lower than 70%. This option must be exercised before the final exam is started. If an exam is retaken, the original exam grade will be erased and the new exam grade will become a permanent part of the course grade. However, before scheduling and attempting this retest, the student must resolve the questions they have in regard to the material by reviewing both the old exam and the lesson module material. The student is also encouraged to contact the phone help line for assistance. Once ready to attempt the retest of the exam they must contact their instructor to request that the exam be reset for the retest. Remember, any module retest must be requested and completed before the final exam is opened.