

GEORGIA PERIMETER COLLEGE
 MATHEMATICS ACADEMIC GROUP
 COMMON COURSE OUTLINE

COURSE ABBREVIATION MATH 1431H

CREDIT HOURS 3

COURSE TITLE Introduction to Statistics (Honors)

PREREQUISITES Successful completion of any collegiate-level mathematics course and acceptance into the Honors Program

CATALOG DESCRIPTION This course is designed for students whose programs require a course in statistics as well as for those who wish to elect such a course. Topics to be covered include descriptive statistics, basic probability, discrete and continuous distributions, sample estimation of parameters, hypothesis testing, tests on means and proportions, chi-square tests, correlation, and linear regression.

This course is MATH 1431 for honors students.

EXPECTED EDUCATIONAL RESULTS

As a result of completing this course, the student will be able to:

<ol style="list-style-type: none"> 1. Analyze statistical problems using critical thinking skills, such as deciding on appropriate statistics to measure and suitable tests to be performed; 2. Support statistical analyses using the course-required calculator whenever possible; 3. Use computer software to support statistical analyses; 4. Define basic descriptive and inferential statistical terms; 5. Select a random sample; 6. Construct frequency and relative frequency tables and histograms, stem-and-leaf diagrams, boxplots, and scatter diagrams; 7. Determine the mean, median, mode, standard deviation, range, and quartiles for a set of data; 8. Interpret and apply z-scores; 	<ol style="list-style-type: none"> 1. Analyze statistical problems using critical thinking skills, such as deciding on appropriate statistics to measure and suitable tests to be performed; 2. Support statistical analyses using the course-required calculator whenever possible; 3. Use computer software to support statistical analyses; 4. Define basic descriptive and inferential statistical terms; 5. Define terms of Experimental Design; 6. Select a random sample; 7. Construct frequency and relative frequency tables, histograms and boxplots, and categorize the shape; 8. Define the mean, median, mode, standard deviation, range, and quartiles and calculate their values for a set of data using the course required calculator or computer software; 9. Identify outliers from a data set; 10. Calculate, interpret and apply z-scores; 11. Understand and apply basic concepts of probability;
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<p>9. Compute regular and conditional probabilities of events from a contingency table;</p> <p>10. Using contingency tables, determine the probability of the compound event A and B, and the probability of the compound event A or B.</p> <p>11. Determine the mean and standard deviation for a discrete probability distribution;</p> <p>12. Make appropriate checks for normality of distributions and apply the properties of normal and standard normal distributions;</p> <p>13. Use the standard normal distribution to determine probabilities.</p> <p>14. Interpret the Central Limit Theorem and compute the standard error of the mean and its standard deviation;</p> <p>15. Determine confidence intervals for the mean and proportion of one population for large samples or normally distributed populations;</p> <p>16. Apply the basic model of hypothesis testing and select the appropriate distribution to make inferences about a population mean and proportion or the difference between two population means and proportions, including the use of z-, t-, statistics;</p> <p>17. Test experimental results against known distributions (goodness-of-fit) and the statistical independence of two variables in experiments where results are organized in contingency tables;</p> <p>18. Write a regression line equation which best represents data relating two variables and interpret and/or make predictions from the line;</p> <p>19. Compute the linear correlation coefficient for a regression line and interpret its significance;</p> <p>20. Identify components of Statistical Design.</p> <p>21. Apply techniques for Analysis of Variance (ANOVA).</p> <p>22. Demonstrate appropriate use of selected statistical techniques through a research project.</p>	<p>12. Compute regular, compound, and conditional probabilities of events from a contingency table;</p> <p>13. Compute binomial probabilities and their mean and standard deviation;</p> <p>14. Make appropriate checks for normality of distributions and apply the properties of normal and standard normal distributions to determine probabilities;</p> <p>15. Use the Central Limit Theorem to describe the sampling distribution of the sample mean and sample proportion;</p> <p>16. Determine confidence intervals for the mean and proportion of one population for large samples or normally distributed populations;</p> <p>17. Apply the basic model of hypothesis testing and select the appropriate distribution to make inferences about a population mean and proportion or the difference between two population means and proportions, including the use of z-, t-, statistics;</p> <p>18. Apply hypothesis tests using the chi-squared distribution;</p> <p>19. Write a regression line equation which best represents data relating two variables and interpret and/or make predictions from the line;</p> <p>20. Compute the linear correlation coefficient and coefficient of determination for a regression line using the course required calculator or computer software and interpret its significance. (#20 revised and moved to number 4)</p> <p>21. Apply techniques for Analysis of Variance (ANOVA).</p> <p>22. Demonstrate appropriate use of selected statistical techniques through a research project.</p>
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GENERAL EDUCATION OUTCOMES

- I. This course addresses the general education outcome relating to communication as follows:
- A. Students improve their listening skills by taking part in general class discussions and in small group activities.
 - B. Students improve their reading comprehension by reading and discussing the text and other materials. Reading mathematics requires skills somewhat different from those used in reading materials for other courses and

these are discussed in class.

- C. Unit tests, examinations, projects, and other assignments provide opportunities for students to practice and improve mathematical writing skills. Mathematics has a specialized vocabulary that students are expected to use correctly.

II. This course addresses the general education outcome related to problem solving and critical thinking as follows:

Students are assessed in a variety of ways that allow them to demonstrate individual and group problem-solving skills. Opportunities are also provided on tests and other assignments for students to employ critical-thinking skills.

III. This course addresses the general education outcome related to using mathematical skills with quantitative data as follows:

The instructional goals for this course are to provide a sound foundation for the comprehension and application of statistics. Students completing this course successfully will be able to interpret, understand, and communicate fundamental ideas about quantitative data.

IV. This course addresses the general education outcome related to using computer applications as follows:

The student will use appropriate statistical software for application of statistical techniques.

COURSE CONTENT

1. Descriptive Statistics (data analysis)
2. Probability and Probability Distributions
3. Inferential Statistics
4. Linear Regression and Correlation

ENTRY LEVEL COMPETENCIES

Upon entering the course, the student should be able to:

1. Analyze mathematical problems using critical-thinking skills, such as estimation, reasonableness of answer, and writing and interpretation of results;
2. Use algebraic symbols and notation to make meaningful statements;
3. Use a calculator to perform arithmetic operations;
4. Write the equation of a line, given the appropriate information, and solve applications for which linear equations are mathematical models;
5. Solve linear inequalities and relate solutions to intervals on a number line.

ASSESSMENT OF EXPECTED EDUCATION RESULTS

I. COURSE GRADE

The course grade will be determined by the individual instructor using a variety of evaluation methods such as tests, quizzes, projects, homework, and writing assignments. One of the assignments must be a research project. A comprehensive final examination is required; it must count at least one-fifth and no more than one-third of the course grade. The final examination will include items that require the student to demonstrate ability in problem

solving and critical thinking as evidenced by detailed, worked-out solutions.

II. DEPARTMENTAL ASSESSMENT

This course will be assessed every five years. A committee appointed by the Academic Group will grade assessment material.

III. USE OF ASSESSMENT FINDINGS

The MATH 1431 Committee, or a special assessment committee appointed by the Academic Group, will analyze the results of the assessment and determine implications for curriculum changes. The committee will prepare a report for the Academic Group summarizing the finding.

Effective Date: **Draft Fall 2009**

Approved Date: