

**Cedar Crest College**  
**Probability and Statistics – MAT 110 (3 credits)**  
**Spring, 2009**

Instructor: R. Reynolds  
Office hours: Monday, Wednesday, Friday: 7:00 - 7:45 AM, 10 – noon  
Tuesday, Thursday: 7:00 - 9:15 AM, 11 AM - noon  
Or by appointment  
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**COURSE DESCRIPTION:**

This course examines the collection, organization, analysis, and interpretation of data in the context of applications from such fields as business, education, political science, economics, psychology, sociology, nutrition, and medicine. The importance of experimental design and sampling techniques are studied and stressed throughout the course. Elementary probability theory is introduced as well as the following theoretical distributions: binomial, normal, Student's t, and chi-square. Linear regression techniques and correlation analysis are used to study bivariate populations. Computer technology is used heavily throughout the course including an introduction to MINITAB statistical software. An algebra background is required as well as a scientific or statistical calculator. This course cannot be counted toward a major or a minor in mathematics.

**COURSE OUTCOMES:**

Students will demonstrate critical reasoning and problem solving skills within the following contexts:

- Discussing statistics as a necessary way of understanding a world that is increasingly number and information oriented.
- Examining how statistics can be distorted and misused.
- Emphasizing ways information can be simplified and described.
- Stressing the importance of experimental design and sampling techniques particularly as they apply to a student's chosen discipline and research interests.
- Exploring useful methods of making predictions based upon available information considering elementary probability theory and the following important theoretical distributions: binomial, normal, Student's t, and chi-square.
- Studying bivariate populations through linear regression and correlation analysis.
- Demonstrating technological competence in the use of statistical software and the ability to evaluate and explain the generated output.

Students will also expand their ability to clearly communicate (both orally and in written form) their problem solving and quantitative reasoning capabilities.

**INSTRUCTION METHODS:**

The primary method of instruction will be lectures/discussions supported heavily by homework assignments. The homework will consist of pencil-and-paper problems as well as problems to be solved via the computer. Homework problems will be assigned on a daily basis, and the student is expected to have completed the homework before the next class meeting and be prepared to share in discussions relating to these assignments. Some specific homework assignments will be collected and graded. Because the material in this course is cumulative in nature (i.e., later topics depend heavily on mastery of earlier material), students are **strongly** advised to avoid falling behind in these studies. The student should consult the instructor with any questions/difficulties encountered in her/his studies; a student may be referred to the advising center for additional assistance. *Students with documented disabilities who may need academic accommodations should discuss these needs with the instructor during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.*

**ATTENDANCE:**

Attendance will be taken at each class meeting. Students are strongly urged to attend class except in extenuating circumstances and are responsible for all material presented including lectures, announcements of tests and quizzes, and homework assignments. Excessive absence **guarantees** an adverse impact on your course grade. When present in class, students are expected to be **fully** engaged in the class. A student is expected to pay attention, listen carefully, think critically about the material being discussed, and participate; please do not do homework, study for other classes, sleep, etc., while in our class. If the instructor notices such behavior, she will mark the offending student absent. Makeup exams will be administered only if the student notifies the instructor **before** the exam with a valid medical or personal excuse. Late homework will generally be accepted but can earn a maximum grade of C. Makeup quizzes will not be administered except under extraordinary circumstances.

**EVALUATION:**

Two hourly tests and a cumulative final exam will be given. Occasional take-home problems will be collected and graded. Quizzes based on homework problems will be administered regularly. Class participation and individual effort will also enter into the computation of the student’s grade. Each student is expected to do her/his own work; do not invite trouble by working directly with someone else or by using materials not authorized by the instructor. Violations of the Cedar Crest College Honor Code Philosophy will be handled by the instructor, will be reported to the Dean, and will result in a grade of zero on the assignment/exam. Your obligations for this course include attendance at the final exam, on the day and time scheduled by the Registrar’s Office. You should not make travel arrangements until the final exam schedule is published; if you must make plans early, you should schedule your travel after the last final exam day.

Grades will be based on a relative scale with the following tentative weights:

hour exams	40%	(20% each)
quizzes/ homework	30%	
final exam	20%	
instructor		
evaluation	+ <u>10%</u>	(includes attendance and
	100%	class participation)

**REQUIRED TEXT AND CALCULATOR:**

Bluman, Allan, *Elementary Statistics*, sixth edition, McGraw- Hill Publishing.  
A scientific calculator (or equivalent)

## Tentative Course Outline

<b>date</b>	<b>material to be covered in class</b>
1/19	1.1, 1.2 - introduction and overview of statistics
1/21	1.3 – data types
1/23	1.4, 1.5, 1.6 – sampling, experimental design, misleading statistics
1/26	2.1, 2.2, 2.3 –data organization
1/28	2.4 – stem and leaf displays, introduction to statistical software
1/30	3.1, 3.2 – measures of central tendency/distribution shapes
2/2	3.3 – measures of dispersion
2/4	3.3 – coefficient of variation, Chebyshev’s Theorem, Empirical Rule
2/6	3.4 – measures of relative standing
2/9	3.5 – 5 number summary, boxplots
2/11	review
2/13	TEST #1 - Chapters 1, 2, and 3
2/16	4.1, 4.2 - introduction to probability theory
2/18	4.2 – event definition, sample space
2/20	4.3 – event relationships, additive law
2/23	4.4 – independent events, multiplicative law
2/25	4.4 – conditional probability, dependent events
2/27	4.5 – counting rules
3/2	4.5, 4.6 – using counting rules to determine probabilities
3/4	5.1, 5.2, 5.3 – random variables, probability distributions for discrete random variables
3/6	5.3 - expected value
3/16	5.4 - binomial probability distribution
3/18	5.4
3/20	5.4 and review
3/23	review
3/25	TEST #2 - Chapters 4 and 5
3/27	6.1, 6.2 - continuous random variables
3/30	6.3 – standard normal distribution
4/1	6.4 – application problems
4/3	6.5 – sampling distributions, Central Limit Theorem
4/6	7.1, 7.2 – point and interval estimation – z-distribution
4/8	7.2 – choosing the sample size
4/15	7.3 – interval estimation - t-distribution
4/17	7.4 – estimation population proportions
4/20	8.1, 8.2 – introduction to hypothesis testing
4/22	8.3 – hypothesis testing about means – z-test/p-values
4/24	8.4 – hypothesis testing – t-test
4/27	8.5 – hypothesis testing about proportions
4/29	10.1, 10.2, 10.3 – bivariate populations, correlation coefficients
5/1	10.4 – linear regression
5/4	11.3 - chi-square test for independence
5/5	review