

A. Linwood Holton Governor's School
PROBABILITY and STATISTICS
Course Syllabus

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Office Hours: by appointment

Course Description Summary: Probability and Statistics I covers descriptive statistics, elementary probability, probability distributions, estimation, and hypothesis testing. Probability and Statistics II continues the study of estimation and hypothesis testing with emphasis on curvilinear and nonlinear regression, analysis of variance, chi-square tests, and non-parametric methods

Prerequisites: Algebra II

Required Text and Materials:

Introduction to the Practice of Statistics (eighth edition)
by David S. Moore, George P. McCabe, and Bruce Craig
with study guide and *EStat* Pack CD-ROMs;
Using R for Introductory Statistics (second edition)
by John Verzani
Graphing Calculator;
Wacom Intuos tablet and pen;

Students must also have access to a desktop/laptop type computer, with high speed internet connection, outside of daily class time.

Dual Enrollment Credit:

Statistics I: (MTH 241) 3 credit hours; and
Statistics II: (MTH 242) 3 credit hours
College credit is issued through one of four community colleges based on the location of the high school the student attends: *Virginia Highlands Community College, Mountain Empire Community College, Southwest Virginia Community College, or Wytheville Community College.*

[Dual Enrollment Credit option requires that students also have a passing score on the math portion of a placement test (e.g., ASSEST or COMPASS) or SAT Math score of 500 or greater ACT math score of 21 or greater. Some community colleges may have additional requirements for students to be eligible for dual enrollment credit.]

Course Objectives: This course is designed to introduce students to fundamental techniques of probability calculation and statistical analysis. Students will learn basic mathematical tools for effective experiment design, experimental results analysis, inference from sampling data, and probability determination. Class discussion will emphasize how statistics and probability relates to contemporary topics of interest.

Instructional Methods: The course is taught in a “real time”/synchronous lecture/problem Q&A session format via the Internet. Students are required to view the online video series Against All Odds, Inside Statistics - which complements as well as re-enforces textbook material – as well as select lectures from Dartmouth College’s Chance Lecture Series. Furthermore, students are required to view R software tutorial videos and complete related labs.

To facilitate a student’s successful understanding of the concepts and methods required for statistical analysis, additional study aids, the review of which is optional, will be available to the student outside of the class. These include, but are not limited to

- On-line instructor authored example problem videos of problems from the textbook and other sources, that have not been worked in class;
- Workbooks, that “walk” a student through problem solution strategies for example problems;
- Supplemental technical documents and handouts;
- Computer based tutorials, both instructional tutorials in the form of video linked with slides, and example problems; and
- Numerous web sites with additional topic perspectives

Some course material will be made available through the Governor’s School Probability and Statistics course web site. Most course material will be made available through a secondary web site, bnortonhgs.coursesites.com.

Evaluation Methods: Grades will be based upon:

- Class participation;
- Homework assignments;
- R software based analysis assignments;
- Pop quizzes;
- On-line probability and statistics labs and on-line exercises.
- Exams;
- Analysis projects; and
- Comprehensive mid-term and final exam(s).

Typically grades are determined weighted:

- Problem solving skills: 15-25%
- Mid-Term and other Exams: 70-80%
- Comprehensive exams 25% of academic period grade
- Class participation: up to 10%

Grade weight given to assignments (e.g., analysis projects, on-line exercises) will be announced at the time of their assignment.

A grade assignment scale in accordance with the *Governor's School Student Handbook* (i.e., 90-100: A, etc.), both numerical and letter, is used. Averaged grades reported for any one grading period may be scaled upward at the discretion of the instructor. Grades for any semester and/or academic year period, which may also be scaled upward when reported, are determined using actual grades earned by the student. There is no "extra credit."

Attendance: Students are required to attend all classes and to be "in class" at the scheduled daily start time. Regarding the physical location of a student when attending the class, the attendance policies and expectations of the student's home school are to be followed. While in class, students are expected to be attentive and prepared to talk if called upon. Students observed conducting any activity not in keeping with the current class discussion or explicitly permitted by the instructor during that day's class will be immediately dismissed from class for the day, not permitted to return, and receive a grade of zero "for the day". [The grade of zero will be averaged with the student's assignment grades as if an additional 60 point homework assignment were given with a grade of zero for the phantom homework assignment.]

It is not the responsibility of the instructor to remember a student's schedule.

Students can be excused from class and/or class obligations by the Governor's School Probability and Statistics instructor. Local school officials cannot excuse a student from any Governor's School assessment or course work requirement or due date.

Scheduled Exams: Exam times and dates are announced well in advance both in class as well as in the Outlook calendar for the class. Students may access the Outlook calendar through their Governor's School email account. Students must contact the instructor well in advance of any exam date which may be missed due to an scheduled absence. An alternate exam time and/or date, which must be before the announced scheduled time, will be scheduled at the discretion of the instructor. No "make-up" exam after a scheduled exam date will be given. Students failing to obtain an alternate date prior to their absence will receive a grade of zero for the missed exam.

In exceptional cases, and at the discretion of the instructor, other assessment grades may be averaged and the average grade so calculated subsequently used to replace a missed assessment.

Assignment Submission: All assignments must be submitted to the instructor no later than the announced and/or posted due date and time. **No late submissions will be accepted.** The time stamp placed on the email by the Governor's School's email server at the time of delivery to the instructor's email address shall be solely used to determine if a student's work has been submitted on or before the due date and time.

An excused absence does not relieve the student from their obligation to submit work by the announced due date. Also, short-term technical failures at any location do not provide justification for the acceptance of late submissions. (For exceptional cases the course instructor will consider the waiver of the due date and time provided the instructor is consulted as soon as possible. What constitutes an "exceptional case" is determined solely by the instructor.)

Any mailed submissions must be postmarked no later than the due date. It is always the student's responsibility to see that mailed course work is mailed at a time and place to ensure that this requirement is met.

To develop professional work practices and to facilitate grading of work and its return, all hand written assignment work – homework and/or exams - must meet the guidelines listed in the *Assignment Submission Guide*, which is posted on the Governor's School's Probability and Statistics course web site. Work not meeting all of the requirements detailed in the *Assignment Submission Guide* will not be graded, resulting in a recorded grade of zero (0) for the work.

Graded work is returned to the student in the PDF file format as an attachment to an email, which is sent to the student's Governor's School email account.

Course Content:

Topics to be covered include ...

- Data Distributions
 - Graphical Methods
 - Mean, Median, Mode, Variance, and Standard Deviation
 - Normal Distributions
- Data Relationships
 - Scatterplots
 - Correlation
 - Least-Squares regression
- Experiment Design
- Probability
 - Probability Models
 - Random Variables
 - Means and Variances of Random Variables
 - General Probability Rules

- Probability and Inference
 - Sampling Distributions for Sample Means and Proportions
 - Manufacturing Control Charts
 - Confidence Intervals
 - Test of Significance: z test, t test, etc.
- Inference for Distributions and Proportions
 - Inference for a Single Proportion and the Mean of a Population
 - Comparing two proportions and comparing two means
- Inference for Two-Way Tables
 - Chi-Square Test and z test
- Inference for Regression: Simple Linear Regression
- Multiple Regression and Non-Linear Regression by the Method of Least Squares
- One-Way Analysis of Variance
 - The ANOVA hypotheses and model
 - The F test
- Two-Way Analysis of Variance
 - The two-way ANOVA model
- Nonparametric Tests
- Logistic Regression

Code of Conduct: Student must observe the course *academic honesty policy*. A copy of the policy is distributed to all students at the beginning of the term. A copy of the document is also available online by visiting <http://bnortonhgs.coursesites.com>.

All forms of academic dishonesty (also known as academic misconduct or cheating) are dealt with harshly. In keeping with school policy, the minimum penalty will be no credit for the work involved. The instructor refers matters of academic dishonesty to the Governor's School's Director for disposition of outcome. Nevertheless, the course instructor reserves the right to take independent action including, but not limited to, imposition of a failing grade for the work submitted or the course itself.

Policy Applicability: The policy stated in this syllabus as to exam dates, homework assignment submission requirements, academic honesty, etc. supersedes any student's home school policy.

Information & Instructions for Individuals with Disabilities: Students may request academic accommodations for identified disabilities through Holton Governor's School's (HGS) main office, which is located on the second floor of the Southwest Virginia Higher Education Center on the Virginia Highlands Community College campus (276- 619-4326). Administrative staff will evaluate the request, consult with appropriate officials from the student's home school, and develop a plan that outlines necessary and reasonable accommodations to be followed. All correspondence will be kept confidential.

Emergency Statement: In the event of a major interruption of technological connectivity or actual emergency affecting the student's school or the offices of Linwood Holton Governor's School, class meeting times or schedules, assignment deadlines, and grading schemes are subject to changes that may include alternative delivery methods, alternative methods of interaction with the instructor, alternate class materials, changes to class membership, a revised attendance policy; a revised semester calendar and/or grading scheme, etc.

For more general information about plans for dealing with such catastrophic events or emergencies, please consult the following resources:

- The student's home school's Emergency Notification and Response Plan
- The Holton Governor's School web site - <http://www.hgs.k12.va.us> – where instructions will be posted in the event of an emergency.

Should such a situation arise, HGS's Director will work closely with the appropriate school division to resolve it as soon as possible. Students will be contacted through available forms of communication and given specific directions as to how they will proceed to complete their course work, how timelines will be adjusted, etc.

Contact ALHGS:

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