Syllabus: APST 270, Spring semester, 2015

Background

Course title: Introduction to Statistical Methods (ItSM)
Locations: EJCH 103 (Lecture), FA 234 & DMS 106 (Lab)
Course pre-requisite: MATH 126.

Course Description: Lecture + Lab: (3 + 3); 4 Credits. Principles of statistics and application to the fields of biology; engineering; physical, life and environmental sciences; and social sciences, including economics. Emphasis is given to computer applications.

Course goals

The larger context: Silver Core Curriculum Objective 2

Quantitative reasoning is Core Objective 2 in the Silver Curriculum. As stated on the Provost’s website the aim of courses contributing to Core Objective 2 is that:

Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.

This objective aims to ensure that students learn to think critically about mathematical models for relationships between different quantities and use those models effectively and accurately to solve problems and reach sound conclusions about them. Students should be able to comprehend, work with, and apply general mathematical techniques and models to different situations, not just plug problem-specific data into a given formula…. 
These skills will enable students to effectively use and interpret data, formulas, and graphs in the workplace, in the news media, and when making personal finance, health, and other types of decisions as informed citizens.

For further information on Core Objective 2 of UNR’s Silver Curriculum, see http://www.unr.edu/provost/curriculum-central/silver-core-general-education-requirements/silver-core-objectives/core-objective-2

**STUDENT LEARNING OUTCOMES (summary form)**

Students will:

- **SLO 1 (Descriptive statistics):** Engage in critical thinking to justify choice of statistics, legitimate data manipulations, data visualization and expressing verbal variables in algebraic terms; compute statistics using algebraic formulas and statistical software; identify results; design and create appropriate graphics and tables for descriptive statistics.

- **SLO 2 (Probability):** Work with algebraic formulas to make basic probability calculations; identify and generate classic probability distributions; compare sample data to the normal distribution; evaluate the degree of similarity and defend that evaluation.

- **SLO 3 (Inferential Statistics, Part 1):** Provide a foundation (including interpreting a verbal description of a research problem into statistical terms); formulate hypotheses both algebraically and verbally; evaluate alternative candidate statistics (including the assumptions) and defend their choice. Statistics include difference-of-means test ("t-test"), difference-of-proportions test, regression, analysis of variance, chi-squared, and, where appropriate, non-parametric analogs.

- **SLO 4 (Inferential Statistics, Part 2):** Compute the statistical analyses chosen in SLO 3; identify relevant estimates in output from statistical software; design and produce appropriately labeled and clearly presented graphs and tables of statistical results; write correct summaries of and meaningful conclusions about statistical results, drawing both on hypothesis tests and on confidence intervals.
Introduction to Statistical Methods: Syllabus

Direct Assessment Items. Students will be graded on:

- Weekly online homework assignments in multiple choice format, typically reporting on a hypothesis test on a new dataset, including both conceptual and computational questions (25% of grade).
- Weekly lab reports that require interpreting a research question, computing appropriate statistics, and reporting and interpreting results in short answer and paragraph format, typically formulating hypotheses and reporting on a test of them on a new dataset, including both conceptual and computational questions. (35% of grade).
- Responses to "Clicker" questions in each lecture in multiple choice format. (5% of grade); if "random draw" questions are used they will count for 1% and the Clicker questions will count for 4%.
- Three exams of 50 minutes each, similar to lab reports (35% of grade).

Student Learning Outcomes (in detail)

For all the student learning outcomes (SLOs), students will demonstrate (and will be assessed on) their mastery of each outcome in clicker and oral responses to in-class questions; in multiple-choice homework assignments; in free-response lab reports; and in free-response exams. The free-response assessments include fill-in-the-blank questions, short answer questions, and essay questions. (Details are below in the section on "Student deliverables"). Point values for each item are provided in the assessment instructions. Each graded deliverable is scored on a 100-point scale. The weighting of the components is 5% participation (4% clickers, 1% "random draw") questions, 35% lab reports, 25% homework, 35% exams. Thus, your course grade can be computed as: 0.04*(mean participation grade) + (0.01*(mean random draw grade) + 0.35*(mean lab report grade) + 0.25*(mean homework grade) + (0.35*mean exam grade). A calculator is available to help you keep track of your grades. A course grade of 60 is required to pass. All work in this course is cumulative; students will be responsible for retaining any outcomes they have achieved throughout the course (and, ideally, into the future).

1. Descriptive Statistics. As a result of studying the assigned reading, taking notes on lectures, answering in-class questions, producing lab reports, doing homework, and
taking exams, students will be able to conduct descriptive statistics analyses. They will also learn to eschew data preparation practices that can produce misleading and irreproducible results and to differentiate these from legitimate practices such as data transformations. Conducting such an analysis involves (A) preparing the computation by locating the relevant statistic in Minitab and correctly programming Minitab to calculate it, (B) using Minitab, Excel, and Word to build appropriate tables and to diagram graphics for presentation, and (C) explaining the task and its results in prose that includes (i) correct identification of the variable and its type/level of measurement, (ii) correct reporting of the statistic or statistics that have been calculated, and (iii) describing and summarizing in a clear, succinct, and thorough prose interpretation of the calculations, tables, and graphs produced in parts a and b of the analysis. The descriptive statistics that will be assessed are: the frequency and percentage distribution, mean, median, mode, standard deviation, z-score, interquartile range, skewness, correlation, and regression. The graphics will include histograms, histograms with comparison to a normal curve, box plots, line graphs, scatterplots, and scatterplots with comparison to a regression line. Students will also develop fluency in recognizing the mean and variance used as components of new statistical formulas.

Assessment: direct assessment of these outcomes is primarily through the lab reports and homeworks for Weeks 1-3 and portions of Exam 1, but the course is cumulative, so items in this SLO will also be included in subsequent labs, homeworks and exams. For details on assessment procedures, please see the sections, "Class procedures and tasks", "Student Deliverables", and "Grading" below.

2. Probability. As a basis for inferential statistics, students will be able to identify and define key terms in probability and to apply them correctly to novel examples. They will also be able to solve basic probability problems. Students will identify and produce classical probability distributions; will distinguish between them; and will calculate descriptive statistics on them. Students will learn to combine descriptive statistics on a variable in sample data to evaluate whether one would be justified in assuming that the variable probably has an approximately normal distribution in the population from which the sample was drawn. Sampling distributions are an important part of the bridge to inferential statistics: Students will analyze their formulas, will generate them,
and will calculate and graph statistics based on them. Students will also recognize, recall, and state the central limit theorem.

Assessment: direct assessment of these outcomes is primarily through the lab reports and homeworks for Weeks 3-6 and most of Exam 1, but the course is cumulative, so items in this SLO will also be included in subsequent labs, homeworks and exams. For details on assessment procedures, please see the sections, "Class procedures and tasks", "Student Deliverables", and "Grading" below.

3. **Inferential Statistics.** Students will be able fluently to conduct a 7-step hypothesis test involving both the classical hypothesis testing approach and inductive elements, especially the confidence interval, for a standard array of basic inferential statistics. These include:
   
   A. Single sample tests for means & non-parametric analogs  
   B. Single sample tests for proportions  
   C. 2-sample difference-of-means tests & non-parametric analogs  
   D. 2-sample difference-of-proportions tests & non-parametric analogs  
   E. One-way ANOVA & non-parametric analogs  
   F. Simple OLS regression  
   G. Multiple OLS regression  
   H. Chi-squared  

As a result of studying the reading and participating in the lectures, labs, homeworks and exams, students will be able to conduct 7-step hypothesis tests of all of the above statistics.

**Step 1. Building a Foundation.** Students will be able to identify in prose research questions all the key elements to build a foundation for a statistical analysis. Further, they will be to write a concise, yet thorough, summary of the elements. The elements are:

   - Cases/ experimental units  
   - Scope of data (sample or population)
Variables (including identifying which are the predictors and which are the dependent/response variables, when appropriate).
Variable types/levels of measurement
Benchmark/baseline (where appropriate)
Target parameter
Difference or directional expectation (where appropriate)

**STEP 2. COMPOSING THE HYPOTHESES.** Students will be able to generate null and research/alternative hypotheses (one-tailed and two-tailed) from the foundations they build in Step 1 for novel research questions. They will express these both in clear prose and symbolically/algebraically as equations or inequalities.

**STEP 3. EVALUATING AND CHOOSING A METHOD OF ANALYSIS.** Students will be able to identify appropriate alternative statistical methods, to evaluate the methods' suitability for a specific analysis, and to justify their choice. They will be able to evaluate whether that method's assumptions are met, and to evaluate and support their choice of an appropriate fallback strategy (ranging from data transformations or alternative statistical tests), if the assumptions should fail.

**STEP 4. DECIDING ABOUT SIGNIFICANCE AND POWER.** Students will be able to choose a significance level for their statistical test, to relate that correctly to a critical value, and to describe the implications for Type I and Type II errors. Students will be able to determine appropriate sample sizes using power and precision calculations.

**STEP 5. USING A STATISTICAL PACKAGE.** Students will be able to apply their statistical knowledge in order to download datasets from the course website and to conduct statistical analyses using the Minitab statistical package. They will be able to obtain significance tests and magnitude estimates. Students will be able to identify sample statistics and inference information in statistical package output.

**STEP 6. DESIGNING AND CREATING TABLES AND GRAPHS/DIAGRAMS.** Students will be able to design and produce tables and to choose and produce appropriate graphs that clearly present, organize, and label results produced in Step 5.

**STEP 7. WRITING A CORRECT VERBAL "DISCUSSION".** Students will be able to summarize the results; use information about statistical significance to compare the results to the hypotheses; and draw inferences in substantive terms (i.e. not just "hence we reject the
null hypothesis at the X level," but "Hence we reject the null hypothesis that YY... at the X level"). For statistically significant parametric results, students will proceed to use point estimates and confidence intervals to assess magnitudes of relationships.

Assessment: direct assessment of these outcomes is primarily through the lab reports and homeworks for Weeks 7-16 and most of Exams 2 and 3. The exact weighting of the different components of the 7-step process varies among assessments, but typically building the foundation (Step 1) and choosing the significance level (Step 4) weigh very lightly compared to the others. Composing the hypotheses (Step 2) receives a heavier weight in early assessments for each statistic, but declines in importance as students become more fluent. Step 7 is always weighted more heavily than the others. For details on assessment procedures, please see the sections, "Class procedures and tasks", "Student Deliverables", and "Grading" below.

Course information

Teaching team and support

Instructor name: Professor Mariah Evans

Office location: MSS 303

Phone number: 775-784-6333

Email address: ProfessorMariah@gmail.com

Email subject line: ItSM, issue (where "issue" is replaced by the topic of the email)

Office Hours:

  In person: Mondays: 9:30-10:45 at the Dataworks Computer Lab
  Fridays: 10-10:45 in Starbucks at the Joe

  Email: Checked frequently, except Wednesdays

TA name:___________________________________________________________
TA email: ________________________________________________________________

TA office hours: __________________________________________________________

Clicker issues: __________________________________________________________

Citrix issues: (nickcrowl@gmail.com)

**Homework issues:** Technical issues with website: Click on "WebSupport" link at the bottom of each page on the course website.

**Other homework issues:** ________________________________________________

**Other UNR computer system issues:** It is usually most effective to email the help desk (screen shots or snips pasted into a Word file and sent as an attachment) with your name on the subject line and, in the body of the email, tell them you will call. Email them on: help@unr.edu then call them on (775) 682-5000. Ask the name of the person you are talking to and write it down. Then you can get back to them if needed, and if they can't help you, I can advocate for some additional training for them.

**Minitab questions:** Email your TA with "ItSM, Minitab Q" in the subject line; begin by telling us what you tried; use screen shots or paste from the snip tool for quicker resolution.

**Coursepack issues:** First, try the web support links at the bottom of each page on the coursepack. Then, if that does not succeed, email the professor ProfessorMariah@gmail.com with subject line: ItSM, Coursepack.

**Before class starts:**

You will receive a pre-mail providing checklists for getting organized for lecture, lab, and homework in Week 1.

**Recommended preparation:** Please review basic set theory definitions, as we will be using them in probability in Week 03. Minitab, the statistical package/computer program we will be using in the course can be accessed via UNR’s Citrix system, but
some students prefer to purchase and install it on their computers. Either way, the prudent student will play with Minitab before the first lab on January 20. Review basic algebra including the order of operations.

Course schedule (tentative, may be revised at the instructor's discretion)

<table>
<thead>
<tr>
<th>Week &amp; topic</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 00</td>
<td></td>
<td></td>
<td>Purchase clicker and coursepack key</td>
<td></td>
</tr>
<tr>
<td>Week 01</td>
<td>1/19/15</td>
<td>1/20/15</td>
<td>1/21/15</td>
<td>1/23/15</td>
</tr>
<tr>
<td>Basic concepts; Descriptive statistics</td>
<td>Holiday</td>
<td>Lab, Week 1</td>
<td>Lecture 0</td>
<td>Chapter 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No homework due</td>
<td>Lecture 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No reading</td>
<td></td>
</tr>
<tr>
<td>Week 02</td>
<td>1/26/15</td>
<td>1/27/15</td>
<td>1/28/15</td>
<td>1/30/15</td>
</tr>
<tr>
<td>More descriptive statistics; graphic presentations</td>
<td>Chapter 2</td>
<td>Lab, Week 2</td>
<td>Chapter 3</td>
<td>Chapter 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Homework, Week 2</td>
<td>Lecture 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture 3</td>
<td></td>
</tr>
<tr>
<td>Week 03</td>
<td>2/2/15</td>
<td>2/3/15</td>
<td>2/4/15</td>
<td>2/6/15</td>
</tr>
<tr>
<td>Decision errors; Probability</td>
<td>Chapter 5</td>
<td>Lab, Week 3</td>
<td>Chapter 6</td>
<td>Chapter 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Homework, Week 3</td>
<td>Lecture 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture 6</td>
<td></td>
</tr>
<tr>
<td>Week 04</td>
<td>2/9/15</td>
<td>2/10/15</td>
<td>2/11/15</td>
<td>2/13/15</td>
</tr>
<tr>
<td>Probability distributions</td>
<td>Chapter 8</td>
<td>Lab, Week 4</td>
<td>Chapter 9</td>
<td>Chapter 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Homework, Week 4</td>
<td>Lecture 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture 9</td>
<td></td>
</tr>
<tr>
<td>Week 05</td>
<td>2/16/15</td>
<td>2/17/15</td>
<td>2/18/15</td>
<td>2/20/15</td>
</tr>
<tr>
<td>Assessing normality; Review</td>
<td>President's day</td>
<td>Lab, Week 5</td>
<td>Chapter 11</td>
<td>Chapter 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Homework, Week 5</td>
<td>Lecture 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture 11</td>
<td></td>
</tr>
<tr>
<td>Week 06</td>
<td>2/23/15</td>
<td>2/24/15</td>
<td>2/25/15</td>
<td>2/27/15</td>
</tr>
<tr>
<td>Sampling distributions; Central Limit Theorem</td>
<td>Chapter 13</td>
<td>Homework, Wk. 6</td>
<td>Chapter 14</td>
<td>Chapter 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No homework due</td>
<td>Lecture 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture 14</td>
<td></td>
</tr>
</tbody>
</table>
# Course schedule (continued)

<table>
<thead>
<tr>
<th>Week &amp; topic</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic of hypothesis tests; h-tests for one mean</td>
<td>Chapter 16</td>
<td>Lab, Week 7</td>
<td>Chapter 17</td>
<td>Chapter 18</td>
</tr>
<tr>
<td>Confidence intervals; h-tests for 1 mean &amp; for 1 proportion</td>
<td>Chapter 19</td>
<td>Lab, Week 8</td>
<td>Chapter 20</td>
<td>Chapter 21</td>
</tr>
<tr>
<td><strong>Week 09</strong></td>
<td>3/16/15</td>
<td>3/17/15</td>
<td>3/18/15</td>
<td>3/20/15</td>
</tr>
<tr>
<td>Spring break: No reading; no lab; no lecture</td>
<td>Lecture 19</td>
<td>Homework, Week 7</td>
<td>Lecture 20</td>
<td>Lecture 21</td>
</tr>
<tr>
<td>H-tests &amp; CI's for Difference of means (DoM)</td>
<td>Chapter 22</td>
<td>Lab, Week 10</td>
<td>Chapter 23</td>
<td>Chapter 24</td>
</tr>
<tr>
<td><strong>Week 11: Review; Exam 2; Difference of proportions (DoP); DoM &amp; Regression</strong></td>
<td>3/30/15</td>
<td>3/31/15</td>
<td>4/1/15</td>
<td>4/3/15</td>
</tr>
<tr>
<td>Exportation, Wk. 11</td>
<td>Lecture 25</td>
<td>Homework, Week 10, in your regular lab time</td>
<td>Lecture 26</td>
<td>Lecture 27</td>
</tr>
<tr>
<td><strong>Week 12</strong></td>
<td>4/6/15</td>
<td>4/7/15</td>
<td>4/8/15</td>
<td>4/10/15</td>
</tr>
<tr>
<td>Nominal predictors: Regression &amp; ANOVA; Assumptions</td>
<td>Chapter 28</td>
<td>Lab, Week 12</td>
<td>Chapter 29</td>
<td>Chapter 30</td>
</tr>
<tr>
<td><strong>Week 13</strong></td>
<td>4/13/15</td>
<td>4/14/15</td>
<td>4/15/15</td>
<td>4/17/14</td>
</tr>
<tr>
<td>Confidence intervals &amp; scenarios in simple regression</td>
<td>Chapter 31</td>
<td>Lab, Week 13</td>
<td>Chapter 32</td>
<td>Chapter 33</td>
</tr>
</tbody>
</table>

10
Course schedule (continued)

<table>
<thead>
<tr>
<th>Week &amp; topic</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 14</td>
<td>4/20/15</td>
<td>4/21/15</td>
<td>4/22/15</td>
<td>4/24/15</td>
</tr>
<tr>
<td>Multiple regression</td>
<td>Chapter 34</td>
<td>Lab, Week 14</td>
<td>Chapter 35</td>
<td>Chapter 36</td>
</tr>
<tr>
<td></td>
<td>Lecture 34</td>
<td></td>
<td>Homework, Week 14</td>
<td>Lecture 36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture 35</td>
<td></td>
</tr>
<tr>
<td>Chi-square and review</td>
<td>Chapter 37</td>
<td>Lab, Week 15</td>
<td>Chapter 38</td>
<td>Chapter 39</td>
</tr>
<tr>
<td></td>
<td>Lecture 37</td>
<td></td>
<td>Homework, Week 15</td>
<td>Lecture 39</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lecture 38</td>
<td></td>
</tr>
<tr>
<td>Week 16</td>
<td>5/4/15</td>
<td>5/5/14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review</td>
<td>Chapter 40</td>
<td>Homework, Wk. 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lecture 40</td>
<td>regular lab @ your lab time or sign up</td>
<td>to take it at Final Class Meeting sessions</td>
<td>8-8:50 or 9-9:50 Wed. May 13 (FA 234)</td>
</tr>
</tbody>
</table>

**Required texts, course materials:**

- Our online coursepack which includes the required textbook (Evans, Mariah. 2015. *Introduction to Statistical Methods*. Kendall-Hunt), the labs, the homework assignments, and many supporting materials is hosted by Great River Learning. You will access your Text, Labs, Notetakers, and Homeworks through this site. Purchase your code from the ASUN book store or directly on site. *(Beware of third party vendors, as there have been several selling false codes at an apparently attractive discount. The problem is that these dishonest vendors simply invented plausible numbers, rather than purchasing them from the publisher, so the false codes do not provide you with access to the coursepack.)*

- The URL is:  http://www.grtep.com/
That URL should take you to this screen:

When you are registering at this site, please be sure that the name you use is identical to your name exactly as it appears on MyNevada. If they are not identical, your grade could be calculated incorrectly when we merge grades from multiple sources at the end of the semester.

- Minitab (This statistical software is available to UNR students to use online on any computer for free through UNR’s Citrix server; or purchase online and install on your computer for speedier work, if you prefer)

- Microsoft Word (available free to students on all UNR lab computers)

- Clicker (this is the standard UNR clicker; if you do not already have one, purchase yours at the ASUN bookstore). Once you have your clicker, register it immediately. You will not get participation points if you do not register your clicker.

Class procedures, tasks, and student deliverables

- **READING.** Study the Chapter from the online textbook before the Lecture. The Chapter for each lecture is in the Learning Module for that particular lecture in the online coursepack on the GRTEP site. Deliverables: At the end of some readings, the text will direct you to a task to conduct and bring to lecture. Those tasks will count as part of your lecture participation for the day. **Hint:** Take your
notes directly on each Chapter using notes or comments on the pdf and then save it into a folder structure organized by Lesson or print and file in a binder. Cross-reference with Homeworks, Notetakers, and Labs. You will need them for reference in research-oriented classes in your major and in advanced statistics classes. Handy to review before doing your homework and in the open book exams, too.

- **HOMEWORK**

  - **SCHEDULING YOUR HOMEWORK.** You should do the Homework after reviewing the Readings and Notetakers for the prior week and after doing the Reading for the due date. The Homework is due before 10am each Wednesday, except that in each Exam week, Homework is due by 8am on the Tuesday. This exception is because the Homeworks for exam weeks are test preparations, so they are most helpful to you before the exam! Allowing 2 hours for the whole homework process would be appropriate for most students. The prudent student starts early on the practice homework in order to allow time for review and, if needed, seeking support from the teaching team.

  - **DOING HOMEWORK.** Go to the course website and find the day’s Homework. It will look approximately like this:

You will enter your answers via a multiple choice and T/F format “quiz”. Each Homework unit includes a "Practice Homework" and a "Graded Homework". **Recommended strategy:** You should first attempt the Practice Homework. If you do
not receive a perfect score the first time, do the suggested reviews, and then attempt the Practice Homework again. Repeat this process until you receive a perfect score. Note that no grade is recorded for your Practice Homeworks: Their function is to help you achieve the standards of skill and knowledge for particular SLOs that are required to excel on the Graded Homeworks. Then proceed to the Graded Homework. You are only allowed one attempt at each question on the Graded Homework, so take screen shots as you go (for your records and in case the system crashes). Note that you must answer the questions on the Graded Homework in order: If you skip a question, you will not be able to go back and answer it later.

Homework will not be announced in class. Homework is the out-of-class component of the labs and is expected to take you roughly 2 hours per week (including the preparatory review, the Practice Homework and the reviews indicated in your feedback). It will often use Minitab, so you should plan to do it at a time and place when you will have Minitab available. Plan to learn to use Citrix to access Minitab.

Hint: Make a record of each homework answer before you submit, in case you have questions. (Screen shots work well.) If you get the answer wrong, you will usually see a suggested review. Study the Reading or Notetaker you are directed to, then continue.

Note to Mac users: In theory Minitab runs on Macs, but students attempting this consistently have trouble, so, if your main computer at home is a Mac, we recommend using a non-Mac computer in one of UNR’s computer labs to do your homework.

• Bring your tools to lectures: (1) If the day's Reading has instructed you to prepare an example or discussion point, remember to bring notes on that to the lecture. (2) Print your Notetaker for each lecture day and bring it to lecture (or bring it on your tablet or laptop). Hint: Save your annotated Notetakers in a binder or in a clear, logical folder organization on your computer. Cross-reference with your text, Homeworks, and labs for easy access in this class and in your future research and lab classes. (3) Bring your Clicker to each lecture to get class participation points.
• **Lecture Procedure:** The instructor will provide a lecture usually organized in the same way as your Notetaker and will provide participation activities. Participation activities will include "clicker questions" (to which all students will respond), random draw questions (to which only the chosen student needs to respond), "Your turn" short applications -- thinking of a substantive example in which to apply the concepts or statistics we are learning (all students develop these; joint work with neighbors is encouraged; random draw an volunteers present their inventions). When there is a green slide on the screen you are encouraged to discuss it with your neighbor. From time to time, the instructor will invite the class to invent learning aids: Mnemonic devices and other tools to help fellow students learn and remember. **Missing Lecture:** You are adults and therefore able to make rational choices about missing class. You are allowed to miss 5 lectures without penalty (your 5 lowest clicker participation grades and your 5 lowest random draw grades will be dropped). These dropped grades are intended to cover UNR’s excusable reasons for missing class: (1) your own illness, (2) death or serious illness in the immediate family, (3) observance of religious obligations, (4) participation in university-sponsored activities of considerable importance (e.g. athletic meetings). You are likely to need at least two absences for unexpected reasons, so if you are expecting more than three absences for Reasons 3 or 4, please notify me right away. "Save up" your allowed absences as they are intended to cover all reasons for absence. When you are "using up" an allowed absence, there is no need to notify us (the grade will be dropped automatically). **Exception to participation requirement:** Students who achieve and maintain the Mastery Learning Option standards are not required to attend/participate in lecture beginning in Week 7, but will automatically receive participation credit.

• **Go to Lab Each Week.** Your first lab will be in the location for the section you signed up for on Tuesday, January 20 (that’s in Week 1) at the time you signed up for. Your lab instructor will provide a brief introduction to the lab and will circulate during the lab to help you troubleshoot problems that arise. For each Lab, you will download a Lab Instruction Sheet. Depending on the Lab, you will enter your Lab Report directly on the Lab Instruction Sheet (which then becomes you Lab Report). Submit it by the end of the Lab period, unless otherwise
instructed by your TA. In your first lab, you will form a research team and work with them for the rest of the term. Discussing the course material (as well as listening, reading, and writing about it) deepens your comprehension. If you do not want to work with others, you should drop this class as you will lose points for doing solo lab work. Your TA will read your draft Lab report and provide a grade, comments, and suggestions for improvement. If you choose to revise (highly recommended), your grade for the lab will be based on your revised version i.e. the grade for your first attempt will not count.

*Missing lab*: Your two lowest lab grades will be dropped. As with lecture, save these up to use for UNR’s excusable reasons for missing class.

*Hint*: Save your labs --either printed and located in a binder or saved into your folder structure on your computer. Cross reference them with your Readings and Notetakers so that you can find things efficiently for Homework and exams. Spend a little time now to save a lot of time (and possibly grief) later.

*Exception to lab participation requirement*: Students who achieve and maintain the Mastery Learning Option standards (mean exam grades and mean lab grades over 95) are not required to attend/participate in lab beginning in Week 7. They must complete each Lab (first attempt a revision, if needed) on time.

- **Exams** are held in your regular lab at your regular lab time on the dates shown in the course calendar above. **Grading**: Partial credit; no second chances. There may be an extra credit question (it will be extra hard). **Acceptable resource use**: Consult your text, your notes, and computer-based fixed resources such as YouTube, the UCLA statistics site, etc. Your saved Homeworks, and annotated Notetakers, Lab Reports, and text Chapters are valuable resources that you have developed. Cross-reference them sensibly and they will be very useful at exam time. (Congratulate yourself on a job well done!) **Unacceptable resource use is academic dishonesty**: Interaction by asking (or answering) questions or otherwise communicating with a person during an exam is not allowed. You may not obtain or examine another student’s exam, nor portions of it, nor may you make your exam in part or in whole available to others. You may not consult
people or tutoring services by email, message, phone or other means during the
exam, nor may you provide information to others. Unacceptable resource use
will earn you an F for the course, and I will request that the administration expel
you. For further details, see the section on "UNR policy on academic dishonesty" below.

Student Deliverables: homework, lab reports, exams, and
clicker and random draw participation

Homework

Homework should take about 2 hours for the typical student. The 2-hour estimate
includes reviewing the prior week’s Readings, lab, and Notetakers. After the review, the
student should log into the GRTEP site (where the Notetakers and Readings are). Each
homework module includes (1) a Practice Homework (multiple attempts allowed; no
grade recorded) and (2) a Graded Homework (only one attempt allowed). There is no
partial credit. Questions on the Homeworks are multiple choice or True/false. Review
suggestions are provided following wrong answers. Most homeworks include a
problem set which is very much like a lab, although some focus on conceptual issues.
There are no extensions or re-openings on homeworks.

Lab

Lab reports typically require you to …

• read a verbal research question;
• download and open a dataset;
• conduct a 7-step hypothesis test on one or more variables in that dataset (using
the statistical package Minitab to perform the statistical calculations);
• design and produce appropriate graphs and tables to display your results; and
• write about your hypothesis test in substantive terms using a standard format.

The labs during weeks 1-3 will have a slightly different format because they focus on descriptive statistics rather than inferential statistics, so they do not involve hypothesis testing. Most labs are due at the end of your laboratory period, but the deadline may be extended at your TA’s discretion until noon on Thursday of the same week. Your TA will preview your lab and return it to you by 5pm Sunday for revision. If you choose to revise, the revision is due by Thursday at noon one week after the original lab due date. Partial credit is given.

Exams

The exams are very much like the labs. They are held in the computer lab at your regular lab time and location. They require you to bring your knowledge of statistics to bear in conducting an analysis of a novel dataset and reporting it in a standard format, following the 7-step hypothesis test format for the 2nd and 3rd exams. Partial credit is available for some questions. Attempting an answer is always better than leaving the answer space blank. There are VERY strict time limits, because many people will need their turns in the computer labs.

Participation

Clicker questions will be shown as PowerPoint slides with a green background; Students with color limited vision will be able to identify these by the “Talk ok” message in the lower left hand corner of the slide. You are welcome to discuss these questions with your neighbors, but you must each operate your own clicker. "Your turn" questions require you to invent an original application of a concept, usually by thinking about an example of interest to you. For many "your turn" questions, I will randomly select students' names and ask them to provide their example.
Grading

Remember that the deep, lasting learning that you engage in is the important part of your investment of time and energy in this class. Aiming to maximize your grade for the least amount of effort would mean that you would cheat yourself in the long run. Nonetheless, it is useful to know how you will be graded.

HOMEWORK: Each "Graded Homework" is marked as points out of 100. On each question, no partial credit is allowed. The "Practice Homeworks" are for your benefit as preparation and no grade is recorded for them. Contribution to course grade: Your lowest 3 homework grades are dropped. The mean of your remaining homework grades is multiplied by 0.4 and then added to the other weighted components of your grade.

Computer problems: If necessary, your lab instructor/TA will notify you that a deadline extension is available due to computer problems arising from the computers in the lab or from the UNR system. Do your homework early to avoid running into problems with heavy computer traffic at the last minute. Achieving academic integrity in homework: Do not give other students hints that direct them to the correct procedure. Do not give them (or allow them to obtain) your answers. If you have questions about what is allowed email your TA. A grade of 0 for the homework portion of the course is the penalty for the first violation of academic integrity in homework; a course grade of F is the penalty for the second violation.

CLASS PARTICIPATION: Participation for each lecture is graded as points out of 100 based on the number of clicker questions answered. Full credit is given for both right and wrong answers. "Random draw" participation: For certain questions, I will draw student names at random. Here, too, full credit is given for answering (whether right or wrong). The random draw helps you develop strong intuitions about probability! Contribution to course grade: Your lowest 5 clicker participation grades are dropped. The mean of your remaining clicker participation grades is multiplied by 0.04 and then added to the other weighted components. The percentage of random draws of your name that you have answered is multiplied by 0.01 and then added to the other weighted components. (You receive full credit for answering, even if the answer is
Missing class participation: No credit will be given for missed class participation, unless you document that the reason for your absence is one of those mentioned in UNR guidelines as excusable reasons for missing class: (1) your own illness, (2) death or serious illness in the immediate family, (3) observance of religious obligations, (4) participation in university-sponsored activities of considerable importance (e.g. athletic meetings). Reasons 3 and 4 are foreseeable, so students anticipating them are required to notify the instructor at least a week in advance: Doing so will result in a participation grade of 100 for that class and failure to do so will result in a participation grade of 0. Reasons 1 and 2 must be notified and documented ASAP; doctors’ notes should be scanned and attached to an email. With prompt notification and plausible support, you will receive 100 participation points for the missed lecture under these conditions; otherwise you will receive a zero. Your name will be omitted from the random draw on the days when you are absent for excusable reasons, so no adjustment will be needed. Forgotten clicker/ dead battery: At the end of lecture, hand the instructor a note describing the situation and giving your full name and netid. You can receive full participation credit for up to two such occasions. Following these instructions will bring you a participation grade of 100 for that lecture; failure to follow them earns a grade of 0. DRC accommodations: Please consult with the instructor to make a plan. Avoiding academic dishonesty with clickers: Operating another student’s clicker when they are not present is cheating on the part of both the student falsely obtaining credit for the clicker answers and on the part of the student operating the clicker. On the first offence, both students will receive scores of -200 for that lecture. On the second offence, the offenders will receive a score of -500 for that lecture. See the section on "UNR Academic Dishonesty Policy" below.

Each lab report is graded as points out of 100, with partial credit allowed. We will give you suggestions for revision of wrong answers, and corrected submissions are accepted with full credit available for suitable revision by the due date. Contribution to course grade: The mean of all your lab grades is multiplied by 0.25 and then added to the other weighted components. Missed labs: No credit will be given for missed Labs (i.e. grade of zero), unless you document to your lab instructor/ TA that the reason for your absence is one of those mentioned in UNR guidelines as excusable reasons for missing
Introduction to Statistical Methods: Syllabus

class: (1) your own illness, (2) death or serious illness in the immediate family, (3) observance of religious obligations, (4) participation in university-sponsored activities of considerable importance (e.g. athletic meetings). Reasons 3 and 4 are foreseeable, so students anticipating them are required to notify their lab instructor/ TA at least one week in advance and to do their Labs early, on a date agreed with the lab instructor. Reasons 1 and 2 must be notified and documented ASAP, ideally within the week, and an alternative plan must be made with your lab instructor/ TA. Computer problems: If necessary, your lab instructor/ TA will notify you that a deadline extension is available due to computer problems arising from the computers in the lab or from UNR. DRC accommodations: Please consult your instructor as soon as possible, so that we may make arrangements that meet your needs. Avoiding academic dishonesty in lab work: Work with your team, program together, and discuss the answers to the questions in the lab instructions/ lab report. Each team member may copy and paste output from your joint programming into their individual lab report. Single word or short phrase answers may be identical across your team. Verbal answers that are one complete sentence or longer must be written up individually, although your team members are encouraged to provide suggestions for improving what you have written (and you are encouraged to implement them). Of course, you may not copy written answers from students outside your team, nor may you provide your written answers to others before they are graded.

EXAMS: Each exam is graded as points out of 100, with partial credit allowed. Contribution to course grade: The mean of all your exam grades is multiplied by 0.3 and then added to the other weighted components. The exam grade for missed exams will be zero, unless you document to your instructor that the reason for your absence is one of those mentioned in UNR guidelines as excusable reasons for missing class: (1) your own illness, (2) death or serious illness in the immediate family, (3) observance of religious obligations, (4) participation in university-sponsored activities of considerable importance (e.g. athletic meetings). Reasons 3 and 4 are foreseeable, so students anticipating them are required to notify their instructor in advance and to make an alternative arrangement for the exam. Neglecting to take an exam for Reason 3 or 4 without obtaining your instructor’s consent at least two weeks in advance to arrangement will results in an exam grade of zero. Reasons 1 and 2 must be notified and documented ASAP, so that the instructor and the student can make an alternative plan.
for exam administration. In the unlikely event of a power outage or other disruptive event beyond student control, your instructor will make an alternative plan and will inform you of it in the lab or as soon as possible. **DRC accommodations:** Students with DRC-certified conditions should contact their TA during the first week of classes, so that the lab can be reserved for their use in order to provide appropriate accommodations. **Avoiding academic dishonesty in exams:** Feel free to use your Notetakers, Readings, Labs and Homeworks as resource materials in exams. You may also look up existing fixed materials in books or online. During the exam, do not consult anyone else (in person, or by messaging, or by email, or by phone or by any other means). Do not provide your answers to other students or allow other students to obtain your answers. Do not view other students’ exams. Do not present as your own answers that were written by someone else or told to you by someone else. There are multiple versions of the exams: Do the version assigned to you. If you submit a different version, you will receive a zero for the exam.

**COMPONENT WEIGHTS:** Homework 0.25; Exams 0.35; Labs 0.35; Class participation 0.04, Random draw participation 0.01

**OVERALL COURSE GRADE:** The weighted components are added together to make the numerical course grade.

**LETTER GRADES:** This course uses plus/minus grading. Numerical grades are rounded to the nearest whole number and convert into letter grades thus: 95-100 A; 90-94 A-; 86-89 B+; 83-85 B; 80-82 B-; 76-79 C+; 73-75 C; 70-72 C-; 66-69 D+; 63-65 D; 60-62 D-; <60 F.

**How to monitor your grades**

After you do each Homework on the GRTEP course website, record the grade. Many students find it convenient to keep them in an Excel file. Download your lab, participation, and exam grades from the “My Grades” tool on the WebCampus site.

To calculate your course grade, calculate your mean grade for each component (Homework, Exams, Labs, Class participation, Random draw). You will learn how to calculate means in the Lectures and Reading of Descriptive Statistics. Then multiply each component’s mean by its weight (Homework 0.25; Exams 0.35; Labs 0.35; Class participation 0.04, Random draw participation 0.01).

The sum of those weighted means is your course grade.
Or just enter your mean task grades into the “Grade Calculator” on the GRTEP site, and it will perform the calculations for you. That is your numerical grade. You can put hypothetical numbers into the grade calculator to see how your final grade will change if you make different possible scores (say, what will happen if you skip a lab or if you get 95s on all the exams, etc.). That is called a “simulation”. You can convert these numerical grades into letter grades using the conversion above.

Note: Because the different student deliverables have different weights, you cannot simply add up all your grades and divide by the number of items to calculate your course grade.

---

**Academic conduct**

A huge majority of students work hard and submit their work honestly for assessment. To support the ethic of academic honesty, this course follows UNR standards of academic conduct.

All rights and regulations concerning academic honesty and plagiarism, as they appear in the current University catalog, will be upheld in this course. Please review the definition of academic integrity on the University Web Page http://www.unr.edu/student-conduct/policies/university-policies-and-guidelines/academic-standards/policy. Violations include improper citation of sources; using another student’s work; reusing assignments submitted in another course; and inadvertent as well as deliberate misrepresentation of one’s own work. Academic dishonesty (including both the "donor", if applicable, and the student submitting the dishonest work) in this course will result in a minimum academic penalty of a grade of 0 for the assignment in question for homeworks and a final course grade reduction of one full point (e.g. from A to B, or B to C, etc); a grade of 0 for the assignment in question and a final course grade reduction of two full points for labs (e.g. from A to C or from B- to D-); a course grade of F for academic dishonesty in an exam. For "clicker" participations in lecture, a grade of -200 will be given for that class participation for the first violation, and -500 for the second violation for "clicker" participation. Alternatively, disciplinary action may be taken by the Academic Integrity Board.
Be familiar with the UNR Academic Dishonesty Policy:

Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student's enrollment without a grade, giving an F for the course or for the assignment. For more details, see the University of Nevada, Reno General Catalog.

Or see details on www.unr.edu/stsv/acdispol.html

---

**Student support services**

The following information is quoted or adapted from:

**Disability Services**

If you have a disability needing academic adjustments or accommodations, please bring the instructor your form from the Disability Resource Center (Thompson Building, Suite 101) specifying those accommodations as soon as possible. Promptitude is especially important if accommodations are needed for the exams, as we may need to make special reservations for the computer lab.

**Academic Success Services**

Your student fees cover usage of the Math Center (784-4433 or www.unr.edu/mathcenter), Tutoring Center (784-6801 or www.unr.edu/tutoring-center), and University Writing Center (784-6030 or http://www.unr.edu/writing-center). These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is a sign of a responsible and successful student.
Audio and Video Recording

Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Welcome!

Wow! There is a great deal of information in this syllabus. It may seem a little overwhelming, but we like you to have access to all the information you may need about the course. The really important thing about the course is that statistics is useful in every walk of modern life -- you will need to use statistics yourself, and you will want to know statistics for information and for self-defense against people who want to snow you! The other important things about statistics are that statistics are fun (you will see) and that they bring order out of chaos, to your lasting benefit.