

# GISAT 251: TOPICS IN APPLIED STATISTICS (SEC 1) - Fall 2014

## COURSE AND INSTRUCTOR INFORMATION

**Meeting Times:** Tuesday & Thursday 2:00pm-3:15pm in ISAT/CS 343  
**Instructor:** Nicole Radziwill, Ph.D., MBA  
<http://nicoleradziwill.com>  
**Office:** ISAT/CS 325  
**Phone/SMS:** 703.835.6336 (SMS or Email 24/7)  
**Email:** [radziwnm@jmu.edu](mailto:radziwnm@jmu.edu) (OR [nicole.radziwill@gmail.com](mailto:nicole.radziwill@gmail.com) if urgent)  
**Office hours:** Monday night hacking sessions from 8pm-12am in ISAT/CS 337  
Wednesday mornings 9-noon by appointment  
In person, Skype or gChat by appointment anytime! (24/7)

## NATURE OF COURSE CONTENT

### COURSE DESCRIPTION

Welcome to GISAT 251. This course is part of the core foundational curriculum for ISAT majors and is also applicable for GenEd credit in Cluster 3, Track I, Group 1. This is a **BLENDED COURSE** that combines face-to-face time in class with online, self-directed activities that will allow you to take more control over your personal learning.

<b>Face to Face Components:</b>	<b>Online/Asynchronous Components:</b>
<ul style="list-style-type: none"><li>• Short lectures (~20 min ea.)</li><li>• In-class activities (e.g. data collection)</li><li>• Team-based recitation (problem solving) sessions</li></ul>	<ul style="list-style-type: none"><li>• Working on IDAAs with Recitation Groups</li><li>• Exams and Practice Quizzes</li><li>• Videos on Selected Concepts</li><li>• Statistical Software Training</li></ul>

This course covers some of the most important and practical quantitative reasoning skills that you will ever need, regardless of your major or chosen area of ISAT concentration. You will learn to COLLECT, ANALYZE, and INTERPRET REAL DATA to better understand ***many real-world situations*** that you encounter every day.

### COURSE STYLE & DELIVERY

This course implements the 10 Principles of the Burning Mind Project as its core value system. (<http://www.burningmindproject.org/the-ten-principles/>) As a result, the course is somewhat self-directed, blended (integrating online and in-class components), and gift-oriented. In many classes, you may ask "what can I get out of taking this class?" However, in this course, we want you to ask the question "what can I give to others as a result of my participation in this class?" Individual gifts are an important component. As you explore the topics, we request that you identify things you are good at and can contribute to a larger, team project. Help your classmates find you if they need your skills to build out a particular solution.

The course consists of two open lab sections per week. Short lectures will be interspersed with interactive activities. Most of your work will be done in pairs or teams, including exams, but oral quizzes will be done individually. The way to succeed in this class is to show up to each scheduled session, and actively participate!

## COURSE SCHEDULE (Subject to Adjustments)

Week 1:	Data, Variables, Characterizing and Graphing Data, 5W's [IDAA 1A: M&Ms]
Week 2:	Randomness & Sampling Strategies [IDAA 2B: Sample Surveys]
Week 3:	The Normal Distribution [IDAA 1B: Auto Safety & 1C: Pulse]
Week 4:	6 Steps of Hypothesis Testing, 12 Steps of Report Writing: Reading Previous Student Projects
Week 5:	Exam 1 & Reverse Engineering Presentations
Week 6:	1-proportion z-test & 1-sample t-test [IDAA 4: Vegetables & Cows]
Week 7:	Sampling Distribution Models & Central Limit Theorem [In-class Exercise]
Week 8:	2-sample t-test and Paired t-test [IDAA 5: Words and Scholarships]
Week 9:	2-proportion z-test & Exam 2
Week 10:	Chi-Square & ANOVA tests [IDAA 7: Chi-Square and ANOVA]
Week 11:	Linear Regression [IDAA 6: Old Faithful]
Week 12:	Intro to Experimental Design [IDAA 2C: Experiments]
Week 13:	Exam 3 & Project Work
** THANKSGIVING BREAK **	
Week 14:	Project Work

## GOALS OF THE COURSE

**Course Objectives:** You will learn how to...

- Use several kinds of visual displays (including graphs and tables) to explore data
- Recognize when sound statistical reasoning is used vs. “blowing smoke”
- Design studies to collect and analyze data so you can answer questions of interest
- Apply statistical reasoning (including formal hypothesis testing) to evaluate how well a given claim is supported by a set of data.

**General Education, Cluster Three learning objectives pertinent to the course are:**

Objective 1: Describe methods of inquiry that lead to mathematical truth and scientific knowledge; be able to distinguish science from pseudoscience. Objective 2: Use theories and models as unifying principles to understand natural phenomena and make predictions. Objective 5: Use graphical, symbolic, numerical methods to analyze, organize, and interpret natural phenomena. Objective 6: Discriminate between association and causation, and identify the types of evidence used to establish causation. Objective 7: Formulate hypotheses, identify relevant variables, design experiments to test hypotheses. Objective 8: Evaluate the credibility, use, and misuse of scientific and mathematical information in scientific developments and public-policy issues.

## METHODS OF EVALUATION

### GRADING

The goal of this course is to *produce artifacts* that demonstrate your understanding of the topics that we cover, and that *provide value* to real clients and/or real people (including your instructors, the students within your learning community, and students who will participate in future learning communities by enrolling in this course).

**Your grade** in this course is ultimately based on **my opinion of your professionalism** as you participate in this class, learn key concepts and how to apply them to problem solving, and demonstrate your ability to explain some of the key concepts and solve problems by the end of the course. **My opinion will be predominantly based on the artifacts you produce, and how you produce them, reflected by your accrued points.**

**Grading is based on accrued points** for completing various labs, exams, and projects, to the satisfaction of the instructor and/or instructor-designated proxies. You get as many chances as you like within a designated time

period to continually improve the quality of your work, but points can only be accrued for successful completion of a particular activity or artifact! There are 80+ available points outlined below.

1 Point Each	2 Points Each	3 Points Each	More Points
<p>1. CAOS Pre-Test (*)</p> <p>2. CAOS Post-Test (*)</p>	<p>3. Prepare formula sheet for one statistical test, including all forms for the null/alternative hypotheses, calculating the test statistic, calculating the sample size, developing the confidence interval, and performing the test in R</p> <p>4. Develop a New Project Proposal</p>	<p>5. Complete an IDAA as an individual or with a group, and pass oral exam</p> <p>6. Complete one exam with at least 85% correct, or, remove deficiencies with oral exam</p> <p>7. Be designated as student expert in one of the course modules, so you can help students complete and understand IDAAs</p> <p>8. Present the results of your project to the class during final exam session</p> <p>9. Extra points if your project(s) are done for a real client, implementing service learning</p>	<p>10. Complete Grp Project with written "12 Steps" report and presentation (*) - 7 points</p> <p>11. Write and submit research paper for JMU Research Journal (<a href="http://jmu.edu/jmurj">http://jmu.edu/jmurj</a>) based on a project you do in this class - 10 points</p>

(\*) = REQUIRED

Grading rubrics for assessment of the team projects will be issued later in the semester.

**Your work plan should take into consideration:**

- That all exercises, labs, and new labs **must be checked off (and points received) by the end the week after they are introduced**. This will help everyone stay on schedule.
- That there will be scheduled sittings for each of the exams. If you plan to take an exam, you should complete the preparatory exercises in advance of those exam dates.
- **That the exercises provided to you are just "starting places"**. I would love to see you develop new IDAAs this semester, or conduct real research projects that you can submit to arXiv.org and/or the new JMU Research Journal!
- You are responsible for keeping track of the points you will accrue. At the end of the semester, you will check your records against mine, so if there are any discrepancies we can resolve them before grades are turned in. **Your accrued points are not "vested" until you complete and present a project.**

**Grading Guidelines:** 50+ accrued points is an A, 40-49 is a B, 30-39 is a C, 10-29 is a D, 9 or below is F. To receive a passing grade in this course, you must successfully conduct and complete CAOS Pre-Test and Post-Test and at least one project. Your accrued points are not "vested" until you complete and present a project.

## REQUIREMENTS & POLICIES

**Textbook:**

Paul Teetor, **R Cookbook**. Order it from Amazon at [http://www.amazon.com/gp/product/0596809158/ref=as\\_li\\_tl?ie=UTF8&camp=1789&creative=390957&creativeASIN=0596809158&linkCode=as2&tag=qualandinowe-20&linkId=GMVX2K666THNK756](http://www.amazon.com/gp/product/0596809158/ref=as_li_tl?ie=UTF8&camp=1789&creative=390957&creativeASIN=0596809158&linkCode=as2&tag=qualandinowe-20&linkId=GMVX2K666THNK756)

**Statistical Software:**

R - Free, Open Source!

1. Download it onto your computer from <http://www.r-project.org> (instructions are in "Intro to R" in Course Materials as well as first chapter of your required textbook)
2. The latest version of R is also installed in all the ISAT computer labs

**Textbook Policies:**

Question: **DO I HAVE TO GET A BOOK?** Short Answer: **YES**.

Question: **WHEN DO I HAVE TO GET ACCESS TO THE BOOK?** Answer: **NOW**.

Question: **CAN I SHARE A BOOK WITH MY FRIEND/TEAMMATE/DOG?** Answer: **Sure**, just don't complain to me if your friend is hogging the book and/or you haven't been able to get in touch with them by cell phone. It's YOUR responsibility.

Question: **WHERE DO I GET THE BOOK?** Answer: AMAZON.  
[http://www.amazon.com/gp/product/0596809158/ref=as\\_li\\_tl?ie=UTF8&camp=1789&creative=390957&creativeASIN=0596809158&linkCode=as2&tag=qualandinnowe-20&linkId=GMVX2K666THNK756](http://www.amazon.com/gp/product/0596809158/ref=as_li_tl?ie=UTF8&camp=1789&creative=390957&creativeASIN=0596809158&linkCode=as2&tag=qualandinnowe-20&linkId=GMVX2K666THNK756)

Question: **CAN I SHARE AN ONLINE RENTAL OF AN ELECTRONIC BOOK WITH MY FRIEND/TEAMMATE/DOG?** Answer: **Sure**, if you can figure out how to do it on your own. I don't know how the system works - all I know is that I have an electronic book, and it's working fine for me. I haven't tried to share it with any fellow humans or animals.

**Journal Policies:** I expect you to keep a journal with all the problems you've worked out for our recitation sessions. I'll be meeting with you occasionally during the semester, and more extensively at the end of the semester, to review your journal.

Question: **CAN MY JOURNAL BE ELECTRONIC?** Answer: **NO**. Except for the parts where you have to use the Minitab or R statistical software. There, I expect you to print out your results and attach them into your journal (e.g. with scotch tape).

Question: **WHAT FORMAT DO YOU EXPECT?** Answer: What I would LOVE to see is a 3-ring notebook with notebook paper or 8.5x11" white/gridded paper that you punch holes in, with dividers that keep them separate based on which Course Module (1-6) we're working on.

Question: **WHY SHOULD I DO THIS JOURNAL THING AT ALL?** Answer: Because it will help you learn the material more than you can realize, and it will help me keep track of whether you're spending enough time trying to work through problems from week to week. Also, if I really like your journal at the end of the semester, and think you exerted consistent effort on it throughout the semester, I'll allow you to drop your one lowest exam grade OR two lowest IDAA grades. So it's great insurance.

**Attendance Policy and Final Exam:** I will not take attendance in the Monday afternoon lecture session. Attendance WILL be taken in the recitation sessions where active participation is EXPECTED. You are allowed TWO absences from recitation for any reason, but after that, I reserve the right to take away a percentage point from your recitation grade for each session missed.

Question: **WHAT DO I DO IF I MISS A LECTURE?** Answer: The slides we go through will be on Blackboard. You should review those. You should make sure that you check in there to see which problems you have been assigned for recitation, and what weekend work will be required before the next Monday lecture.

Question: **WHAT IF I MISS A LECTURE WHERE WE DID AN IMPORTANT INTERACTIVE ACTIVITY, LIKE WHEN WE COLLECT DATA ON OUR M&Ms?** Answer: Then you'll have to ask your classmates what we did, buy your own M&Ms, and do the exercise on your own. (In short, it's just not a good idea to miss a lecture session.)

Question: **SHOULD I EMAIL/TEXT/STOP YOU AFTER CLASS TO LET YOU KNOW IF I WILL MISS A LECTURE?** Answer: No. But it's your responsibility to leverage *online resources and your classmates* to figure out what went on during the session, if you must miss it. Please don't come to me and say "I missed class on Monday. What did we do?" My job is to tell you that stuff *on Wednesdays, during class*.

**Incompletes:** I do NOT give incompletes in this class (any more). Failure to complete the semester project and present with your team during Final Exam Week makes it very unlikely that you'll pass this class, so please plan ahead and start working on your semester projects early.

**Honor Code:** You are expected to read, understand, and abide by the JMU Honor Code (<http://www.jmu.edu/honor/code.shtml>) at all times.

**Special Needs:** If you are a student who is registered with the Office of Disabilities, I need to be given written documentation to support your situation in order to provide you with any accommodations (this is required by law). **Plans for any accommodations MUST be made within the first week of this course.**

**Contacting the Instructor:** You can contact the instructor any time (24/7) via email or SMS to 703.835.6336. If you text, PLEASE say who you are, and from what class. I really honestly don't mind being contacted at any time of day because I have chronic insomnia, so there's as good a chance of your question getting answered at 3am as there is at 3pm. If I'm really busy or asleep, I'll turn my ringer off. If you don't hear from me within 24 hours, contact me again. I AM ALWAYS HAPPY TO HELP YOU OUT.