STA 311 – Intro Statistical Computing and Data Management
Spring 2021

CONTACT INFORMATION

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Office Hours: Monday/Tuesday/Wednesday: 1:00 PM -3:00 PM
By appointment

COVID-19 STATEMENT

Part of West Chester University's response to the COVID-19 pandemic was to switch the vast majority of instruction to remote instruction. This decision was made out of an abundance of caution to protect the health of all members of the WCU community. Faculty have been asked to make every effort to adapt their courses to this novel situation while still meeting the critical learning outcomes of the course. Students are asked to discuss any problems with the new course format and schedule directly with their instructors. Patience and flexibility on everyone's behalf are critical to our community's navigation of this public health crisis.

For this particular course, the following alternative modalities are being utilized: *Remote Asynchronous (RA) Instruction*.

COURSE SYLLABUS

Textbooks:

Required: (Free Ebook through WCU's Library, need to login in credential to access the book)
Learning SAS by Examples: A Programmer's Guide, by Ron Cody, Cary, NC: SAS Institute Inc. 2018.

Optional:
Delwiche and Slaughter, The Little SAS Book, SAS Press (any edition will be fine), some old editions have online versions.

Course Description:
The course will give students the ability to manage and manipulate data effectively, conduct basic statistical analysis, and generate reports and graphics primarily using the SAS Statistical Software Program.

Student Learning Objectives:

1. Demonstrated an understanding of probability and statistical inference, including the fundamental laws of classical probability, discrete and continuous random variables, expectation theory, maximum likelihood methods, hypothesis testing, power, and bivariate and multivariate distribution theory.

2. Demonstrated the ability to apply the elementary methods of statistical analysis, namely those based on classical linear models, categorical methods, and non-parametric ideas to perform data analysis for statistical inference.
3. Demonstrated proficiency in the effective use of computers for research data management and analysis of data with standard statistical software packages, particularly SAS.
4. Learned to develop and critically assess the design of experimental studies and the collection of data.
5. Applied one or more methods of statistical inference to an area of interest, particularly the program in the elective concentration.
6. Gained practical experience in statistical consulting and communicating with non-statisticians, culminating with interaction with research workers at a local company as part of the internship practicum.

Course Student Learning Outcomes: after finishing this class, a student will be able to

1. Manage, manipulate, and transform various types of data. [SLO3]
2. Perform basic statistical procedures on actual data sets using SAS. [SLO2, SLO3]
3. Write computer programs to accomplish various tasks. [SLO2, SLO3]
4. Produce and interpret descriptive reports and graphics. [SLO2, SLO3, SLO6]
5. Students will have the background and training to complete the Base SAS Programming Certification Exam. [SLO3]

Meeting & Assessing Student Learning Outcomes: Following methods will be used to assess students' learning outcomes

1. Midterm exams will test students understanding of individual topics.
2. Regular lab reports will assess students' understanding of particular data steps and procedures.
3. The final exam/project will assess students' comprehensive understanding of all topics covered in the entire semester.

Attendance Policy: Attendance in this class is mandatory. I will take random attendance. Your overall attendance rate will be based on the random attendance that I will take in the semester.

Important Dates:

The last day to add/drop	Monday, 2/1/2021.
The last day to withdraw	Monday, 3/29/2021.
Fall break & Thanksgiving	Monday, 3/15/2021 – Sunday, 3/21/2021. No Class
Last day of the session:	Sunday, 5/9/2021.

Assignments: There will be different assignments for this class.

(1). Regular Take-home Labs via D2L – I will assign labs regularly during the semester. These labs contain multiple-choice questions and will be graded through D2L.

(2). A Term Project – The project will focus on data management and simple descriptive statistics. Multiple data sources will be used in the project

Evaluation & Grading: Course grade will be determined by the following components:
(1). Weekly quizzes via D2L (30%)
(2). Two midterm exams (20% each)
Exam 1: Thursday, 3/4/2021.
Exam 2: Thursday, 4/22/2021.
(2). Final exam (20%): Wednesday, 5/12/2021.
(4). Data analysis project report (10%): Thursday 5/13/2021

A letter grade will be assigned based on performance in the course according to the following scale:

Grade	Quality Points	Percentage Equivalents	Interpretation
A	4.00	93-100	Excellent
A-	3.67	90-92	
B+	3.33	87-89	Superior
B	3.00	83-86	
B-	2.67	80-82	
C+	2.33	77-79	Average
C	2.00	73-76	
C-	1.67	70-72	
D+	1.33	67-69	Below Average
D	1.00	63-66	
D-	0.67	60-62	
F	0	< 60%	Failure

Refer to the Undergraduate Catalog for a description of NG (No Grade), W, Z, and other grades.

Exam Make-up Policy: There will be NO make-up exams for this class. If you must miss an exam under an unusual circumstance, I will replace your missing midterm exam grade with the grade you earned from the cumulative final exam.

FREE TUTORING SERVICES

The Mathematics Department provides free tutoring services to students enrolled in a statistics class at all levels. The university learning center also provides similar services. The schedules will be provided to you when they are available.

TENTATIVE TOPICS

Following is the list of tentative topics to be covered in this class. The actual delivery order may be slightly different from the topic list. I also reserve the right to adjust the topics as we move forward during the semester to ensure that you will accomplish your goal and be challenged in the class.

Tentative Topics	
Week 01	• Introduction • Citrix installation • Description of SAS • Concepts of programming • "Hello World!" - Your first SAS code
Week 02	• Navigating SAS Environment • Storing and Accessing SAS Data Files • Coding Conventions and File/Folder Structure • Guidelines for Formatting and Commenting • Methods of Data Input: Column Input

Week 03	• Input styles for raw data
	  ○ Column and list input
	  ○ Formatted (column pointer) and hybrid input
	• Avoiding truncation: LENGTH statement
	• Making your SAS data set more informative: LABEL statement
	• Reading specially formatted data correctly: FORMAT/INFORMAT
	• A first glance at SAS Dates
	• Reading external text data files: INFILE
	• Other good stuff: delimited file, data options- FIRSTOBS and OBS

Week 04	• Loading complex data to SAS
	  ○ Missing values: DSD and MISSOVER
	  ○ Delimited data: DLM
	  ○ Non-standard variable formats: (&) and (:)
	• Read in external data with input WIZARD: Excel, CSV, Text, etc.
	• PROC IMPORT: Excel, CSV, Text, and other formats such as SPPSS data
	• DATA step for CSV file: INFILE-INPUT
	• Load SAS data set to SAS: SET
	• PROC EXPORT: from SAS to CSV or other formats
	• Some control statements to modify an SAS data (if time permits)

Week 05	• Read in TXT and CSV files
	  ○ DATA Step: INFILE-INPUT Statement
	  ○ PROC IMPORT
	• PROC MEANS
	  ○ Basic statistics

	○ Output SAS data • PROC FREQ: Basics ○ Basic frequency tables ○ Output frequency tables as SAS data sets • PROC UNIVARIATE: ○ Basic descriptive statistics and histogram ○ Output analysis results as an SAS data set
Week 06 Exam #1	• Load SAS data file SAS data files ○ SAS built-in permanent libraries ○ User-defined permanent libraries • SAS Statistical Graphic Procedures ○ SAS ODS Graphics ○ PROC SGPLOT • Basic Statistics for This week ○ Histogram ○ Bar chart ○ Scatter Plot ○ Density Curve ○ Box plot ○ Simple Linear Regression Lines
Week 07	• Subsetting and Splitting • Subsetting Records ○ Partial Reading- FIRSTOBS, OBS ○ Conditional extraction: IF-THEN-ELSE, WHERE • Subsetting Variables ○ Selecting designate variables: SELECT ○ Dropping designate variables: DROP • Splitting Data - generating multiple datasets ○ Conditional output of multiple data sets: IF-THEN-OUTPUT, SELECT-WHEN-OUTPUT-END
Week 08	• one-to-one reading: multiple SET statements • Concatenating: SET statement with multiple datasets ○ Data options: RENAME, DROP, and KEEP • Interleaving Data: BY statement • Match Merging ○ IN option for invisible dummy variables ○ Subsetting by conditioning on the "ghost" variables • Real-world application: Creating an analytical dataset for detecting the association between COVID-19 fatality and demographics (unemployment, education, and poverty) at US county-level data

Week 09	• SAS Date and Time Functions • Automatic Variables • Defining New Variables • Variable type conversion • Use of Logical Expressions • Operators with WHERE statement • Real-world application • Real-world application: Creating an analytical dataset from the COVID-19 county data

Week 10	• SAS Character Functions
	  ○ Handling Leading Zeros and Substring Extraction: INDEXC, SUBSTR, LENGTH, and LEFT
	  ○ Substring Substitution: TRANSLATE
	  ○ Handling Blanks: COMPRESS, COMPBL, TRIM
	  ○ Concatenation: CATs family of functions
	• SAS DO-Block: DO-loop, DO-UNTIL, DO-WHILE Loops
	• RETAIN with DO-block: Within Group Operations in Longitudinal Data

Week 11	• More SAS Loops
	• SAS ARRAYS
	  ○ Syntax
	  ○ Basic types of SAS ARRAYs
	  ○ Applications of ARRAYs
	• Reshape Data
	  ○ ARRAY Approach
	  ○ PROC TRANSPOSE

Week 12
 	
Exam #2
	• SAS ODS Output Files
	  ○ Syntax
	  ○ Types of file destinations (file format)
	  ○ Save output files with the desired format
	  ○ ODS Graphics
	• Optional Topics
	  ○ PROC REPORT (details to be covered next week)
	  ○ SAS MACRO: An Example

Week 13	• PROC REPORT
	  ○ Basic Report
	  ○ DEFINE statement and options:
	  ○ COMPUTED Block for defining the new column
	  ○ Options GROUP and ACROSS
	• Enhancing the Appearance of PROC REPORT Output

	• The ODS Destination and Exporting Report

Week 15	• Basic SAS MACROs
	• MACRO Variable
	• MACRO with No Parameters
	• MACRO with Parameters
	  ○ Passing Positional Parameters
	  ○ Passing Keyword Parameters
	  ○ The mixture of Positional and Keyword Parameters

ACADEMIC & PERSONAL INTEGRITY

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the Ram's Eye View, and the University website at www.wcupa.edu.

STUDENTS WITH DISABILITIES

If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University's Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at https://www.wcupa.edu/universityCollege/ossd/. In an effort to assist students who either receive or may believe they are entitled to receive accommodations under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, the University has appointed a student advocate to be a contact for students who have questions regarding the provision of their accommodations or their right to accommodations. The advocate will assist any student who may have questions regarding these rights. The Director for Equity and Compliance/Title IX Coordinator has been designated in this role. Students who need assistance with their rights to accommodations should contact them at 610-436-2433.

EXCUSED ABSENCES POLICY

Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

REPORTING INCIDENTS OF SEXUAL VIOLENCE

West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to comply with the requirements of Title IX of the Education Amendments of 1972 and the University's commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. **Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University Protection of Minors Policy.** Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at
https://www.wcupa.edu/_admin/diversityEquityInclusion/sexualMisconduct/default.aspx

EMERGENCY PREPAREDNESS

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

ELECTRONIC MAIL POLICY

It is expected that faculty, staff, and students activate and maintain regular access to University-provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.