MAT121 Statistics I

Winter 2025/26

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Office Hours:

Day	Time	Location
Wednesday	1:00 PM – 3:00 PM	Zoom Only
Thursday	1:00 PM – 3:00 PM	Zoom Only

Please make good use of my office hours when you need help. I will be happy to work with you either via Zoom or in person.

ZOOM Link: Available on the top navigation panel of the course web page.

Course Web Page: https://pengdsci.github.io/MAT121Winter/

Course Logistics:

Textbook: not required. Self-contained lecture notes will be posted on the course webpage.

Calculator: A scientific calculator is sufficient for this course. However, if you have a graphing calculator, that works perfectly as well!

Course Description (from the Catalog):

Introduction to statistics and statistical inference. Concepts include descriptive statistics, sampling distributions, confidence intervals, and hypothesis testing, along with a formal introduction to linear regression and categorical data analysis. Statistical software, including but not limited to SPSS and Excel, will be used to facilitate the understanding of important statistical ideas and for the implementation of data analysis in many areas of application.

Course Learning Outcomes:

1. Describe a dataset by producing appropriate graphs and calculating descriptive statistics.
2. Interpret graphs and descriptive statistics.
3. Understand and apply the Central Limit Theorem.
4. Compute and interpret confidence intervals for population means, proportions, and differences in means and proportions.
5. Perform and interpret tests of hypotheses for means, proportions, the difference in means (independent and dependent samples), and proportions.
6. Perform a linear regression to determine the relationship between two quantitative variables and make predictions using the linear regression equation. Interpret the slope, correlation coefficient, and coefficient of determination.

7. Be proficient in all of the above using some type of technology.

Topics:

We will cover topics including data collection, frequency distributions, measures of central tendency and variability, scatter plots and correlation, probability, definitions of random variables, confidence intervals, and hypothesis testing. Students will also use the interactive statistics learning application **ISLA** (https://pengdsci.github.io/ISLA/), created by the instructor specifically for this class.

Evaluation:

- Midterm Exams 80% (20% each). Open at noon on Friday every week on D2L and close on Sunday at 11:30 PM. You can start the exam at any time during this two-and-a-half-day period. The duration of each exam is 120 minutes.

- Final Exam 20%.
  Date: **Sunday, 1/18/2026**
  Time: 3:30 PM – 5:30 PM
  Location: D2L

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.

Make-up Policy: There will be no make-up exams.

Important Dates: Some important dates of the summer semester are listed in the following

Event	Full 5-Weeks [1] (1)	
First Day of the Semester/Part-of-Term	12/15	Monday
First Day of Add/Drop	12/15	Monday
Last Day of Add/Drop	12/16	Tuesday
First Day of Course Withdrawal	12/17	Wednesday
Last Day of Course Withdrawal	01/07	Wednesday
Last Day to Elect Audit or Pass/Fail	01/07	Wednesday
Last Day of Session/Part-of-Term Withdrawal	01/15	Thursday
Final Exams	Last Day of Class	
Last Day of the Semester/Part-of-Term	01/18	Sunday

Use of D2L:

1. All exams will be administered via D2L. Everyone will have their own version of the exam.
2. All printed course materials will be posted on the **course web page,** which is also linked to your D2L front page. **You are expected to check the course webpage regularly for updates.**

Weekly Learning Materials (https://pengdsci.github.io/MAT121Winter/): Three modules will be covered every week. In each module, you will

1. Study a lecture note including embedded short videos.
2. Rework the examples manually in the note and use the interactive learning apps to check your work,
3. practice online exercises and check your manual work using the learning apps.

After you have completed all the learning materials for the week, you must take the weekly exam on D2L. The exam is released every Friday. For more details about the weekly exam, please visit the course website (https://pengdsci.github.io/MAT121Winter/) for more information about specific weekly exams.

IMPORTANT NOTE: The following list of tentative topics is subject to change as the semester progresses if it will enhance student learning and the overall quality of the course.

Tentative Course Schedule-Subject to Change

Topic 1	• Course outline and logistics • Frequency tables and charts

Topic 2	• Numerical measures- raw data
	  ○ Central tendency
	  ○ Variation (spread)
	  ○ Location: Z-score and Quantile
	  ○ Boxplot and IQR

Topic 3	• Probability concepts
	• Additive probability rules
	• Concepts of Random Variables
	  ○ Characterizing discrete random variables
	  ○ Characterizing continuous random variables

Topic 4	• Standard Normal Distribution
	  ○ Standard normal distribution table
	  ○ Given two z-scores to find the probability
	  ○ Given one z-score and the probability of finding the other z-score
	• Normal Distribution
	  ○ z-score transformation
	  ○ Two basic problems of normal distributions
	• Central limit theorem (CLT)
	  ○ The sampling distribution of the sample means

Topic 5	• Review of Sampling Distribution of Sample Means
	  ○ The case of normal populations
	  ○ The case of a large sample
	  ○ The case of A small sample
	• Sampling distribution of sample proportions
	  ○ The CLT for sample proportions

Topic 6	• The concept of confidence interval (CI) for the mean
	  ○ Terms of the confidence interval
	  ○ Steps for constructing a confidence interval
	• Normal confidence intervals for μ and p
	  ○ The case of a large sample (CLT)
	  ○ The case of proportion: $np>5$ *and* $n(1-p)>5$

Topic 7	• T-distribution
	  ○ Use of the t-table to find critical values
	• t-confidence interval for μ.
	  ○ Steps for constructing t-confidence intervals

Topic 8	• Conceptual Framework of Hypothesis Testing
	  ○ The logic of hypothesis testing
	  ○ The components and terms of hypothesis testing

Topic 9	• Normal Tests – Critical value and p-value methods
	  ○ Large sample test for population μ
	  ○ Testing p when $np>5$ and $n(1-p)>5$

Topic 10	• t-test – Critical value method only (for this class)
	  ○ small normal sample with unknown σ
	• Testing two dependent population means: paired tests
	  ○ Dependent populations: before and after designs

Topic 11	• Tests based on two independent samples
	  ○ Testing population means: two-sample t-test
	  ○ Testing population means: two-sample normal test

Topic 12	• Two-sample confidence intervals
	  ○ Two-sample normal confidence intervals
	  ○ Two-sample t-confidence interval (using pooled sample variance)
	  ○ Two-sample confidence intervals proportions

Topic 13	• Correlation coefficient
	• Least-squares regression line
	• Inference of Linea Regression
	  ○ Coefficient of Determination
	  ○ Hypothesis Testing on the Slope Parameter

Topic 14	• Concepts of the goodness of fit test ○ Observed and null tables • Chi-square test of independence

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 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.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

West Chester University is committed to providing equitable access to the full WCU experience for Golden Rams of all abilities. Students should contact the Office of Educational Accessibility (OEA) to establish accommodations if they have had accommodations in the past or if they believe they may be eligible for accommodations due to a disability, whether or not it may be readily apparent. There is no deadline for disclosing to OEA or for requesting to use approved accommodation in a given course. However, accommodations can only be applied to future assignments or exams; that is, they can't be applied retroactively. Please share your letter from OEA as soon as possible so that we can discuss accommodation.

If you have concerns related to disability discrimination, please contact the university's ADA Coordinator in the Office of Diversity, Equity, and Inclusion or 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 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: Office of Diversity, Equity, and Inclusion.

INCLUSIVE LEARNING ENVIRONMENT AND ANTI-RACIST STATEMENT

Diversity, equity, and inclusion are central to West Chester University's mission as reflected in our Mission Statement, Values Statement, Vision Statement, and Strategic Plan: Pathways to Student Success. We disavow racism and all actions that silence, threaten, or degrade historically marginalized groups in the U.S. We acknowledge that all members of this learning community may experience harm stemming from forms of oppression, including but not limited to classism, ableism, heterosexism, sexism, Islamophobia, anti-Semitism, and xenophobia, and recognize that these forms of oppression are compounded by racism.

Our core commitment as an institution of higher education shapes our expectations for behavior within this learning community, which represents diverse individual beliefs, backgrounds, and experiences. Courteous and respectful behavior, interactions, and responses are expected from all members of the University. We must work together to make this a safe and productive learning environment for everyone. Part of this work is recognizing how race and other aspects of who we are shape our beliefs

and our experiences as individuals. It is not enough to condemn acts of racism. For real, sustainable change, we must stand together as a diverse coalition against racism and oppression of any form, anywhere, at any time.

Resources for education and action are available through WCU's Office for Diversity, Equity, and Inclusion (ODEI), DEI committees within departments or colleges, the student ombudsperson, and centers on campus committed to doing this work (e.g., Dowdy Multicultural Center, Center for Women and Gender Equity, and the Center for Trans and Queer Advocacy).

Guidance on how to report incidents of discrimination and harassment is available at the University's Office of Diversity, Equity, and Inclusion.

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 WCU Alert. 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 will 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.