

# NUR 626

## Applied Biostatistics for Outcome Evaluation

**Instructor: Dongjuan (Donna) Xu, PhD, RN**

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Office Hours: by appointment

### Course Information

Dates: August 22- December 17, 2022

Credit Hours: 3

**Course Format:** The course syllabus and administrative information and course materials will be posted on Purdue's Brightspace online platform for you to view and download. All assignments will be posted on Brightspace, and it will be the mechanism for turning in your assignments. Be sure to log into your Brightspace site for this course.

**Review Sessions:** Help sessions including two in-person meetings and nine online meetings will be held throughout the semester (see Class Schedule). Students can attend using a WebEx video link for the online course. In these sessions, I will:

- Review course materials and assignments
- Demonstrate use of SPSS
- Answer student questions

### Course Description

In this course, students will learn biostatistics commonly used in nursing and health services research, particularly in evaluating health outcomes. Students will learn descriptive, bivariate, and multivariable statistics. They will apply these statistics in the analysis of data using statistical software, and they will understand how to interpret statistical results.

### Prerequisites

NUR 510 Nursing Research and an undergraduate statistics course within the last five years.

## Learning Outcomes

Upon completion of the course, students will be able to:

1. Formulate a research question in healthcare organization, delivery, quality or outcomes.
2. Select a research approach and methods for investigating research questions.
3. Assemble data, assess its accuracy, and construct an analyzable data file.
4. Select appropriate descriptive and inferential statistics to:
  - a. Describe the characteristics of individuals, organizations and communities;
  - b. Assess the relationships between variables;
  - c. Generalize from a sample to a population; and
  - d. Test hypotheses.
5. Conduct statistical analysis with SPSS software.
6. Interpret statistical findings:
  - a. Recognize standard statistical terminology and symbols;
  - b. Determine statistical significance; and
  - c. Assess the strength of relationships.
7. Describe results from statistical analyses.
8. Prepare a written report from analysis of an existing data set.

## Texts and Software

### Required Texts

Grove, S.K and Ciper, D.J. Statistics for Nursing Research: A Workbook for Evidence-Based Practice. 3rd Edition, 2019.

Amazon:

[https://www.amazon.com/Statistics-Nursing-Research-Workbook-Evidence-Based/dp/0323654118/ref=pd\\_rhf\\_se\\_p\\_img\\_2?encoding=UTF8&psc=1&refRID=ZXC460KFZ25HYG805SF0](https://www.amazon.com/Statistics-Nursing-Research-Workbook-Evidence-Based/dp/0323654118/ref=pd_rhf_se_p_img_2?encoding=UTF8&psc=1&refRID=ZXC460KFZ25HYG805SF0)

Pallant, J. SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS. 7th Edition, 2020.

Amazon:

[https://www.amazon.com/SPSS-Survival-Manual-Guide-Analysis/dp/0335249493/ref=sr\\_1\\_3?dchild=1&keywords=SPSS+Survival+Manual&qid=1593529219&s=books&sr=1-3](https://www.amazon.com/SPSS-Survival-Manual-Guide-Analysis/dp/0335249493/ref=sr_1_3?dchild=1&keywords=SPSS+Survival+Manual&qid=1593529219&s=books&sr=1-3)

### Statistical Software

We will use SPSS (Statistical Package for the Social Sciences) as the analytic software in this course. Students can obtain personal copies through their campus.

## Course Requirements

### Requisite Computer Skills

You should become proficient in computer-related tasks such as browsing the internet, creating Microsoft PowerPoint (electronic) presentations, creating and editing existing Microsoft Word documents, uploading and downloading documents to the course website and saving electronic files to the appropriate directory. These skills are prerequisites for this course.

### **Assignment Requirements**

All assignments will be due by 11:59 PM Eastern Standard Time, on dates provided. Graded assignments will be returned within 3-5 days of due date, in most instances.

Assignments will be available in Brightspace. They will be a mixture of written answers to “thought” questions and analysis and interpretation of quantitative data in SPSS. Assignments should be submitted as:

- MS Word documents, single-spaced, Times New Roman 12-point font. ~~Be sure to include a copy of the questions followed by your answers.~~
- If appropriate -- SPSS data files (.sav), or SPSS output files (.spv), depending on the specific assignment.
- The labels for the submitted files should contain the assignment # and the student’s first and last names.

## **How to Succeed in This Course**

It is crucial that you keep up with weekly activities in order to be successful in this course. You are responsible for completing all readings on or before the week they are assigned. The course covers a great deal of material at a rapid pace.

Your success in this course will depend primarily on the extent to which you **read the course material carefully and reflectively**. It is a 3-credit hour course, therefore, plan to spend 9-10 hours per week reading and applying what you’ve learned in this course. Each class builds upon the material from the previous sessions. Please address any difficulties with the course material as soon as you are experiencing difficulty.

To be successful in this course you should have a good working knowledge of SPSS. The Pallant textbook is an excellent resource for learning basic SPSS skills.

## **Policies**

### **General Course Policies**

- Since this is primarily an online course, students have an extra responsibility to manage their time, keep up with readings and assignments, and complete assignments by the due date.
- Deadlines for assignments will be strictly enforced.

- You are expected to read your @purdue.edu email and check course announcements in Brightspace on a frequent basis.
- The instructor will be available by email if you have questions or need help. Usually I can respond the same day, however it may take a day or two to respond if I am tied up with my research projects or other responsibilities.

### Grading

Graded Assignments	#	Maximum Points/Assignment	Total Maximum Points
There are 12 graded assignments.	12	100	1200

Grade = Percentage of Total Points

- A = 90% - 100%
- B = 80% - <90%
- C = 70% - <80%
- D = 60% - <70%
- F = <60%

### Academic Guidance in the Event a Student is Quarantined/Isolated

*If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center (pphc-notification@purdue.edu), you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at acmq@purdue.edu and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email. We will make arrangements based on your particular situation. Please note that, according to [Details for Students on Normal Operations for Fall 2021](#) announced on the Protect Purdue website, "individuals who test positive for COVID-19 are not guaranteed remote access to all course activities, materials, and assignments." The Office of the Dean of Students (odos@purdue.edu) is also available to support you should this situation occur.*

### Attendance Policy during COVID-19

*Students should stay home and contact the Protect Purdue Health Center (496-INFO) if they feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus. In the current context of COVID-19, in-person attendance will not be a factor in the final grades, but the student still needs to inform the instructor of any conflict that can be anticipated and will affect the submission of an assignment or the ability to take an exam. Only the instructor can excuse a student from a course*

*requirement or responsibility. When conflicts can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency conflict, when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via [email](#) or phone at 765-494-1747. Our course Brightspace includes a link on Attendance and Grief Absence policies under the University Policies menu.*

### **Classroom Guidance Regarding Protect Purdue**

*The [Protect Purdue Plan](#), which includes the [Protect Purdue Pledge](#), is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines. Required behaviors in this class include: staying home and contacting the Protect Purdue Health Center (496-INFO) if you feel ill or know you have been exposed to the virus, properly wearing a mask [in classrooms and campus building](#), at all times (e.g., mask covers nose and mouth, no eating/drinking in the classroom), disinfecting desk/workspace prior to and after use, maintaining appropriate social distancing with peers and instructors (including when entering/exiting classrooms), refraining from moving furniture, avoiding shared use of personal items, maintaining robust hygiene (e.g., handwashing, disposal of tissues) prior to, during and after class, and following all safety directions from the instructor.*

*Students who are not engaging in these behaviors (e.g., wearing a mask) will be offered the opportunity to comply. If non-compliance continues, possible results include instructors asking the student to leave class and instructors dismissing the whole class. Students who do not comply with the required health behaviors are violating the University Code of Conduct and will be reported to the Dean of Students Office with sanctions ranging from educational requirements to dismissal from the university.*

*Any student who has substantial reason to believe that another person in a campus room (e.g., classroom) is threatening the safety of others by not complying (e.g., not wearing a mask) may leave the room without consequence. The student is encouraged to report the behavior to and discuss next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities](#). See also [Purdue University Bill of Student Rights](#).*

*Related Considerations:*

1. A listing of recommended safe practices for the specific class or laboratory setting (other PPE or safety behavior) can be found at the links below.
  - [Overarching SOP for Classrooms, Instructional Laboratories, and Experiential Courses](#)
2. References Supporting Protect Purdue Compliance:
  - Office of the Dean of Students [Protect Purdue Compliance Plan: Ask, Offer, Leave, Report](#)
  - Office of the Dean of Students [Managing Classroom Behavior and Expectations](#)

### **Mental Health Statement**

*If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time.*

*If you need support and information about options and resources, please contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.*

*If you find yourself struggling to find a healthy balance between academics, social life, stress, etc. sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at [evans240@purdue.edu](mailto:evans240@purdue.edu).*

**If you're struggling and need mental health services:** Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

### **Academic Integrity**

*Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, Student Regulations] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or*

*indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]*

Purdue's student guide for academic integrity:

<https://www.purdue.edu/odos/academic-integrity/>

Instructor's Policy: Evidence of dishonesty on an assignment will result in zero points for that assignment. Evidence of dishonesty on two or more assignments will result in Failure of the course.

### **Use of Copyrighted Materials**

*Students are expected, within the context of the Regulations Governing Student Conduct and other applicable University policies, to act responsibly and ethically by applying the appropriate exception under the Copyright Act to the use of copyrighted works in their activities and studies. The University does not assume legal responsibility for violations of copyright law by students who are not employees of the University.*

*A Copyrightable Work created by any person subject to this policy primarily to express and preserve scholarship as evidence of academic advancement or academic accomplishment. Such works may include, but are not limited to, scholarly publications, journal articles, research bulletins, monographs, books, plays, poems, musical compositions and other works of artistic imagination, and works of students created in the course of their education, such as exams, projects, theses or dissertations, papers and articles.*

The University Regulations on policies:

<http://www.purdue.edu/policies/academic-research-affairs/ia3.html>

### **Attendance/Assignment Deadlines**

*Students are expected to complete assignments by the deadline. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many University sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, or by contacting the main office that offers the course. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, the student or the student's representative should contact the Office of the Dean of Students.*

The link to the complete policy and implications can be found at:

[http://www.purdue.edu/studentregulations/regulations\\_procedures/classes.html](http://www.purdue.edu/studentregulations/regulations_procedures/classes.html)

### **Missed or Late Work**

Barring permission of the instructor or emergency circumstances (described above), students will receive zero (0) points on missed or late assignments.

### **Grief Absence Policy for Students**

*Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). GAPS Policy: Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for misses assignments or assessments in the event of the death of a member of the student's family.*

### **Violent Behavior Policy**

*Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.*

### **Emergencies**

*In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructor via email or phone. You are expected to read your @purdue.edu email on a frequent basis.*

### **Accessibility**

*Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247. More details are available on our course Brightspace under Accessibility Information.*

### **Nondiscrimination Statement**

*Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.*



*Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Executive Memorandum No. D-1, which provides specific contractual rights and remedies. Any student who believes they have been discriminated against may visit [www.purdue.edu/report-hate](http://www.purdue.edu/report-hate) to submit a complaint to the Office of Institutional Equity. Information may be reported anonymously.*

Purdue's nondiscrimination statement:

[http://www.purdue.edu/purdue/ea\\_eou\\_statement.html](http://www.purdue.edu/purdue/ea_eou_statement.html)

## Class Schedule

Week	General Topic/Module	Readings and Assignments
8/22	Introduction to Statistics	Obtain the required texts and SPSS software Explore the SPSS Survival Manual Website  Readings: Pallant - Chapters 1-3 - Getting Started
8/29	Introduction to Statistics  <u>August 29 (Monday)</u> Help Session 1 ( <i>in-person</i> ): 1:00-4:20 PM Recitation Building (REC) 112	Readings: Grove & CIPHER, Chapter 1-3  Assignment 1 due: September 2
9/5	Preparing a Data File	Readings: Pallant - Chapters 4, 5, 8  Assignment 2 due: September 9
9/12	Descriptive Statistics and Graphing and Presenting Data  <u>September 12 (Monday)</u> Help Session 2 (online): 2:00-3:00 PM	Readings: Grove & CIPHER – Chapter 6, 9, 27 Pallant – Chapter 6, 7  Assignment 3 due: September 16
9/19	Categorical Data Analysis Chi-Square and other nonparametric tests  <u>September 19 (Monday)</u> Help Session 3 (online): 2:00-3:00 PM	Readings: Grove & CIPHER – Chapter 19, 35 Pallant – Chapter 16  Assignment 4 due: September 23
9/26	Difference of mean and Student's t test, independent samples  <u>September 26 (Monday)</u> Help Session 4 (online): 2:00-3:00 PM	Readings: Grove & CIPHER – Chapter 16, 31 Pallant – Chapter 17  Assignment 5 due: September 30
10/3	Difference of mean and Student's t test, paired samples  <u>October 3 (Monday)</u> Help Session 5 (online): 2:00-3:00 PM	Readings: Grove & CIPHER – Chapter 17, 32 Pallant – Chapter 17  Assignment 6 due: October 7

10/10	ANOVA  <u>October 12 (Wednesday)</u> Help Session 6 (online): 2:00-3:00 PM	Readings: Grove & Ciper – Chapter 18, 33 Pallant – Chapter 18  Assignment 7 due: October 14
10/17	Correlation  <u>October 17 (Monday)</u> Help Session 7 (online): 2:00-3:00 PM	Readings: Grove & Ciper – Chapter 11, 13, 28 Pallant – Chapter 11  Assignment 8 due: October 21
10/24 & 10/31	Linear Regression  <u>October 31 (Monday)</u> Help Session 8 ( <i>in-person</i> ): 1:00-4:20 PM Recitation Building (REC) 112	Readings: Grove & Ciper – Chapter 14, 15, 29, 30 Pallant – Chapter 13  Assignment 9 due: November 4
11/7 & 11/14	Logistic Regression  <u>November 14 (Monday)</u> Help Session 9 (online): 2:00-3:00 PM	Readings: Pallant – Chapter 14  Assignment 10 due: November 18
11/21 & 11/28	Relative Risk, Odds Ratio, and Risk Difference  <u>November 28 (Monday)</u> Help Session 10 (online): 2:00-3:00 PM	Readings: Schechtman, “ <i>Odds Ratio, Relative Risk, Absolute Risk Reduction, and the Number Needed to Treat—Which of These Should We Use?</i> ” <i>Value in Health</i> , 2002. Schmidt & Kohlmann, “ <i>When to use the odds ratio or the relative risk?</i> ” <i>Int J Public Health</i> , 2008.  Assignment 11 due: December 2
12/5	Sensitivity and Specificity  <u>December 5 (Monday)</u> Help Session 11 (online): 4:00-5:00 PM	Readings: Grove & Ciper – Chapter 34 Loong, “ <i>Understanding Sensitivity and Specificity with the Right Side of the Brain.</i> ” <i>British Medical Journal</i> , 2003.  Assignment 12 due: December 9

## Disclaimer

This syllabus is subject to change. Any changes will be posted in the Brightspace Online Learning System.