Kansas State University
College of Education
Department of Special Education, Counseling, and Student Affairs

EDCEP 817 Section ZA: Statistical Methods in Education
Fall 2023
Credit Hours: 3 GR

Instructor Information
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Virtual office hours: By appointments. If you have any questions or concerns, I'll be happy to talk to you. Please email me to schedule a date and time convenient to both of us and we can meet through a virtual Zoom meeting. The zoom session link is:
https://ksu.zoom.us/j/93011973874

Technology problems or questions (e.g., Canvas, Zoom) are best directed to the K-State IT Help desk at: (785) 532-7722; (800) 865-6143; helpdesk@k-state.edu.

College of Education Vision, Mission, and Conceptual Framework Statements
Vision
"Preparing educators to be knowledgeable, ethical, caring decision makers for a diverse and changing world."

Mission
Our mission is fulfilled through:
• delivery of exemplary instruction to students at the undergraduate and graduate levels;
• production, interpretation, and dissemination of sound and useful research and scholarship;
• leadership, collaboration, and service within the profession; and
• promotion, understanding, and celebration of diversity.

Conceptual Framework
The Conceptual Framework serves as the guide for fulfilling our vision of preparing educators to be knowledgeable, ethical, caring decision makers for a diverse and changing world. The College of Education strives to address three major areas in preparing the teachers of tomorrow: general education, content area studies, and professional studies.

The Conceptual Framework organizes 10 *standards* in professional studies into the following four categories (COE CF 1-10):
   1. *The Learner and Learning*
   2. *Content Knowledge*
   3. *Instructional Practice*

4. *Professional Responsibility*

The Conceptual Framework also includes the following ***dispositions*** (COE CF 11-15):
1. *Values Learning and Professional Development*: Dedicated to acquiring and applying new ideas about content, pedagogy, and students.
2. *Commits to Professional, Ethical, and Legal Conduct*: Committed to obeying the law and abiding by institutional, state, and national professional and ethical standards.
3. *Values Positive, Caring, and Respectful Relationships*: Committed to interacting with students, colleagues, and community members with care, compassion, and respect.
4. *Embraces Diversity, Equity, and Fairness*: Recognizes and values human differences and is committed to meet the educational needs of all students.
5. *Commits to Wise and Reflective Practice*: Dedicated to careful reflection on instructional decisions and takes actions to improve professional competence.

Course Description
An introductory yet comprehensive survey of common statistical analyses encountered in educational research. Computer oriented.

Prerequisites
Prerequisites: A first course in college mathematics plus either STAT 702 or EDCEP 816.

Course Objectives and Outcomes
This course, *Statistical Methods in Education,* as a key part of an approved program in the College of Education, relates specifically to the vision, mission and CF of the College of Education and meets the competencies and objectives for Council for Accreditation of Counseling and Related Educational Programs (CACREP) accreditation.

This course is designed to cover a wide range of topics in descriptive and inferential statistical techniques in the organizing of data and the testing of simple hypothesis in educational research. It is primarily an applied statistics course, i.e. instead of concentrating on how to enter numbers in formulas; emphasis is on understanding concepts and processes of descriptive and inferential statistics and interpreting results based on these data. Statistical software package(s) will be used for most calculations, so the course will emphasize the ability to choose, carry out, and interpret the results of appropriate procedures rather than simple computation. After successfully completing this course, students will be able to:

- Recognize and explain various descriptive statistics including frequency distributions and measures of central tendency and dispersion (COE CF 2, 4-9, 11, 15; CACREP VI.4.a-b)*
- Carry out the appropriate descriptive statistical technique when presented with data to answer a particular educational research question (COE CF 4-9, 12, 15; CACREP VI.4.a-b)
- Recognize and explain various inferential statistics often used in educational research (COE CF 2, 4-9, 11, 15; CACREP VI.4.a-b)

- Carry out the appropriate inferential statistical technique when presented with data to answer a particular research question regarding correlation and prediction (COE CF 4-9, 12, 15; CACREP 6.B.4.a.)
- Interpret descriptive and inferential statistics and be able to make appropriate recommendations for practice from these results (COE CF 2, 4-9, 11, 15; CACREP 6.B.4.b.)
- Demonstrate minimum competency in using a statistical software program to perform appropriate statistical procedures (COE CF 4-6, 15)
- Interpret data from statistics software outputs and draw conclusion based on statistical results (COE CF 4-9, 12, 14, 15)
  COE CF: College of Education Conceptual Framework.

Professional Statement for Students in School Counseling/Counselor Education and Supervision Programs

According to 20/20: A Vision for the Future of Counseling, (ACA, 2022), the definition of counseling is: *"a professional relationship that empowers diverse individuals, families, and groups to accomplish mental health, wellness, education, and career goals."*

As a counselor-in-training you have embarked upon a challenging journey to develop yourself into a professional counselor. This is an occupation that requires a professional commitment unlike any other; it requires strong professional identity, leadership and advocacy for all people and populations, and critical attention to life and death issues.

Counselor development is accomplished through basic course content, sound counseling skills, and opportunities to demonstrate professional, ethical, and legal awareness. Opportunities to demonstrate self-awareness through self-reflection are required throughout your program and career.

As a counselor-in-training your job is to grow, learn, and demonstrate appropriate professional dispositions, including personal self-awareness and wellness that allows you to best serve your clients and/or students with nonmaleficence and beneficence.

Textbooks and Materials

This course adopts open/alternative textbook. There is no required commercial textbook. Reading materials will be provided through Canvas course portal.

The following two websites are the main sources for the class.

a. Laerd Statistics (https://statistics.laerd.com/). Lund Research Ltd. - This website doesn't have the map of contents. So I will provide the direct link for each section in Canvas. **Please note that you do NOT need to purchase a membership for this course.** Everything covered in this course is free.

b. Online Statistics Education: A Multimedia Course of Study (http://onlinestatbook.com/2/introduction/introduction.html). Project Leader: David M. Lane, Rice University.

Statistical software (You can choose any one of the following):

SPSS Statistics software (from IBM): K-State students may access SPSS free of charge. Please request the license through this link using your own K-State log in credentials: https://support.ksu.edu/TDClient/30/Portal/Requests/ServiceDet?ID=19 . It may take 1-3 weeks. While you are waiting, you can access the SPSS free trial version is at: https://www.ibm.com/products/spss-statistics . Please click on "Try it now" button. You do need to register for the trial version.

GNU PSPP software: GNU PSPP software is a program for statistical analysis of sampled data. It is a free replacement for the proprietary program SPSS (Statistical Package for Social Science), and appears very similar to it with a few exceptions. You can download it at: http://www.gnu.org/software/pspp/ .

R: You can download it for free at: https://www.r-project.org/ . The manual can be found at: https://cran.r-project.org/manuals.html

SAS: You can download it for free at: http://www.sas.com/en_us/software/university-edition.html . The training can be found at: http://support.sas.com/training/ .

Keep in mind, any statistical software (e.g., PSPP, SPSS, Minitab, SAS) is likely to be sophisticated. If you have never used any statistical software, you need to spend enough time trying it out in order to familiarize yourself with many basic functions. You are expected to work outside of class. The key to master any statistical package is practice, practice, and practice. A minimum competency in using at least one statistical program is required for completing this course.

K-State Email account: Make sure you check your K-State email account on a regular basis. This is your email account on record at K-State and is the only email I will be sending out course-related information. **Please be aware that if you forward your email to another account, the K-State system blocks emails sent to some accounts, especially hotmail and yahoo accounts, so use your K-State account directly.** Make sure you check your K-State email on a regular basis. This is the only email I will send out course-related information.

Methods of Instruction

The class will consist of 1 ½ -2 hours of recorded lectures and 1 hour of weekly synchronous Zoom meeting between 5:30 – 6:30 pm CST. These Zoom sessions are optional and will be recorded and posted in Canvas. The dates are listed on the last page of the syllabus. The zoom session link is: https://ksu.zoom.us/j/93011973874 . This course will incorporate many forms of delivery, which include, but are not limited to: reading, discussion, recorded lectures, individual practice activities and written assignments.

Course Assignments

Assignments (6)	40%
Knowledge Checks (3)	60%
Total	**100%**

Grading Scale: A: 100-90; B: <90 – 80; C: <80 – 70; F: <70

Assignments (40%)

The topics covered in each module are listed at the end of the syllabus. Readings are provided under each Module in Canvas. In order to be prepared for class, you need to complete the assigned reading ahead of time. After each module, you'll be asked to show off your newly acquired statistics skills by completing a statistics assignment. Your ability to use a statistical program and to interpret statistical outputs will be assessed through these assignments. You are expected to complete the assignments on your own. If you have questions or concerns about assignments, I encourage you to ask as soon as possible. But the products should reflect your own work. The homework assignments need to be typed or written clearly. The deadlines of assignment are listed at the end of the syllabus. Please notify me as soon as possible if you have emergencies or illnesses. (COE CF 1-10, 12-14; Core 7c-e, 7g, 8a-b, 8d-f; SC h2-4, i1, i3, j1-3)

Grading policy: If there are gaps/errors in your submissions, you have the option to revise and resubmit. I strongly encourage you to take advantage of it, which could improve your grades.

Knowledge Checks (60%)

Your understanding of the materials will also be evaluated through knowledge checks. There are three timed knowledge checks throughout the semester. The purpose of the knowledge checks is to test your understanding of core statistical concepts and applications. The knowledge checks are open-book, open-notes. But you cannot use Internet resources (e.g., artificial intelligence programs such as ChatGPT, search engines, discussion boards, social media sites, private messengers, etc.). You must complete it on your own. Please only take the knowledge checks on a computer, NOT a tablet or a phone. The dates of the knowledge checks are listed at the end of the syllabus, so please plan accordingly. Please notify me as soon as possible if you have emergencies or illnesses (which requires appropriate paperwork).

I will provide sample questions before each knowledge check. These sample questions cover some key concepts and materials from the class. They serve three purposes: a) to give you the opportunity to evaluate your own learning; b) to help you become familiar with the knowledge checks; and (c) to provide formative feedback to me about student learning, so I can make needed modifications.
(COE CF 1, 2, 5, 8, 9, 11, 13-15; Core 7c-e, 7g, 8a-b, 8d-f; SC h2-4, i1, i3, j1-3)

Grading policy: All knowledge checks are final. No revise and resubmit is allowed.

Extra credit. There are no opportunities for extra credit in this class. Instead, you should be actively involved in the class from day one, contact me if you are having questions, make use of learning materials, the synchronous zoom meetings, and opportunities to revise and resubmit, and other tools to help you learn.

Counseling Program Key Performance Indicator(s)

CES 4- K	Student is able to demonstrate knowledge of quantitative research designs.	Knowledge Check 1

Course Policies

Academic Honesty

Kansas State University has an Honor and Integrity System based on personal integrity, which is presumed to be sufficient assurance that, in academic matters, one's work is performed honestly and without unauthorized assistance. Undergraduate and graduate students, by registration, acknowledge the jurisdiction of the Honor and Integrity System. The policies and procedures of the Honor and Integrity System apply to all full and part-time students enrolled in undergraduate and graduate courses on-campus, off-campus, and via distance learning. A component vital to the Honor and Integrity System is the inclusion of the Honor Pledge which applies to all assignments, examinations, or other course work undertaken by students. The Honor Pledge is implied, whether or not it is stated: "**On my honor, as a student, I have neither given nor received unauthorized aid on this academic work.**" A grade of XF can result from a breach of academic honesty. The F indicates failure in the course; the X indicates the reason is an Honor Pledge violation.

Students with Disabilities

At K-State it is important that every student has access to course content and the means to demonstrate course mastery. Students with disabilities may benefit from services including accommodations provided by the Student Access Center. Disabilities can include physical, learning, executive functions, and mental health. You may register at the Student Access Center or to learn more contact:

Manhattan/Olathe/Global Campus – Student Access Center
accesscenter@k-state.edu
785-532-6441
K-State Salina Campus – Julie Rowe; Student Success Coordinator
jarowe@k-state.edu
785-820-7908

Students already registered with the Student Access Center please request your Letters of Accommodation early in the semester to provide adequate time to arrange your approved academic accommodations. Once SAC approves your Letter of Accommodation it will be e-mailed to you, and your instructor(s) for this course. Please follow up with your instructor to discuss how best to implement the approved accommodations.

Expectations for Classroom Conduct

All student activities in the University, including this course, are governed by the Student Judicial Conduct Code as outlined in the Student Governing Association By Laws, Article V, Section 3, number 2. Students who engage in behavior that disrupts the learning environment may be asked to leave the class. All students in this Global Campus course are expected to obey the Global Campus Netiquette.

Mutual Respect and Inclusion in K-State Teaching and Learning Spaces

At K-State, faculty and staff are committed to creating and maintaining an inclusive and supportive learning environment for students from diverse backgrounds and perspectives. K-State courses, labs, and other virtual and physical learning spaces promote equitable opportunity to learn, participate, contribute, and succeed, regardless of age, race, color, ethnicity, nationality, genetic information, ancestry, disability, socioeconomic status, military or veteran status, immigration status, Indigenous identity, gender identity, gender expression, sexuality, religion, culture, as well as other social identities.

Faculty and staff are committed to promoting equity and believe the success of an inclusive learning environment relies on the participation, support, and understanding of all students. Students are encouraged to share their views and lived experiences as they relate to the course or their course experience, while recognizing they are doing so in a learning environment in which all are expected to engage with respect to honor the rights, safety, and dignity of others in keeping with the K-State Principles of Community.

If you feel uncomfortable because of comments or behavior encountered in this class, you may bring it to the attention of your instructor, advisors, and/or mentors. If you have questions about how to proceed with a confidential process to resolve concerns, please contact the Student Ombudsperson Office. Violations of the student code of conduct can be reported using the Code of Conduct Reporting Form. You can also report discrimination, harassment or sexual harassment, if needed.

Discrimination, Harassment, and Sexual Harassment

Kansas State University is committed to maintaining academic, housing, and work environments that are free of discrimination, harassment, and sexual harassment. Instructors support the University's commitment by creating a safe learning environment during this course, free of conduct that would interfere with your academic opportunities. Instructors also have a duty to report any behavior they become aware of that potentially violates the University's policy prohibiting discrimination, harassment, and sexual harassment, as outlined by PPM 3010.

If a student is subjected to discrimination, harassment, or sexual harassment, they are encouraged to make a non-confidential report to the University's Office for Institutional Equity (OIE) using the online reporting form. Incident disclosure is not required to receive resources at K-State. Reports that include domestic and dating violence, sexual assault, or stalking, should be considered for reporting by the complainant to the Kansas State University Police Department or the Riley County Police Department. Reports made to law enforcement are separate from reports

made to OIE. A complainant can choose to report to one or both entities. Confidential support and advocacy can be found with the [K-State Center for Advocacy, Response, and Education (CARE)](). Confidential mental health services can be found with [Lafene Counseling and Psychological Services (CAPS)](). Academic support can be found with the [Office of Student Life (OSL)](). OSL is a non-confidential resource. OIE also provides a [comprehensive list of resources]() on their website. If you have questions about non-confidential and confidential resources, please contact OIE at [equity@ksu.edu]() or (785) 532–6220.

Student Resources

K-State has many resources to help contribute to student success. These resources include accommodations for academics, paying for college, student life, health and safety, and others. Check out the [Student Guide to Help and Resources: One Stop Shop]() for more information.

Copyright Notification

Copyright 2023 © by Yang Yang, Ph.D., Associate Professor. During this course students are prohibited from selling notes to or being paid for taking notes by any person or commercial firm without the express written permission of the professor teaching this course. In addition, students in this class are not authorized to provide class notes or other class-related materials to any other person or entity, other than sharing them directly with another student taking the class for purposes of studying, without prior written permission from the professor teaching this course. These course materials should be used for educational purposes only; the contents should not be distributed electronically or otherwise beyond the confines of this course. The URLs listed here do not suggest endorsement of either the site owners or the contents found at the sites. Likewise, mentioned brands (products and services) do not suggest endorsement.

Mental Health

Your mental health and good relationships are vital to your overall well-being. Symptoms of mental health issues may include excessive sadness or worry, thoughts of death or self-harm, inability to concentrate, lack of motivation, or substance abuse. Although problems can occur anytime for anyone, you should pay extra attention to your mental health if you are feeling academic or financial stress, discrimination, or have experienced a traumatic event, such as loss of a friend or family member, sexual assault or other physical or emotional abuse.

If you are struggling with these issues, do not wait to seek assistance.

Kansas State University [Counseling and Psychological Services]() offers free and confidential services to assist you to meet these challenges.
[Lafene Health Center]() has specialized nurse practitioners to assist with mental health.
The [Office of Student Life]() can direct you to additional resources.
[K-State Family Center]() offers individual, couple, and family counseling services on a sliding fee scale.
[Center for Advocacy, Response, and Education (CARE)]() provides free and confidential assistance for those in our K-State community who have been victimized by violence.

Technical Knowledge and Resources

Certain technical skills are required for learner success in this course. Instructions on how to access technology assistance (e.g., IT Help Desk, Canvas Help, Media Development Center, K-State Libraries, and many more) can be found at http://global.k-state.edu/students/ . Learner usage of student services such as Getting Started, Resources for Success is provided through K-State Global Campus and Student Life. Please also be aware of online security and computer safety in alignment with K-State IT Security policies .

Other resources provided include:

Support for learner usage of Student Services provided through K-State Global Campus:
- Getting Started
- Resources for Success

Support for learner usage of student services provided by K-State:
- Student Life
- K-State Library resources and services
- Career Center (as needed)
- Counseling Services (as needed)
- Student Access Center

Campus Safety

Kansas State University is committed to providing a safe teaching and learning environment for student and faculty members. In order to enhance your safety in the unlikely case of a campus emergency make sure that you know where and how to quickly exit your classroom and how to follow any emergency directives. To view additional campus emergency information go to the University's main page, www.k-state.edu, and click on the Emergency Information button, located at the bottom of the page.

Academic Freedom

Kansas State University is a community of students, faculty, and staff who work together to discover new knowledge, create new ideas, and share the results of their scholarly inquiry with the wider public. Although new ideas or research results may be controversial or challenge established views, the health and growth of any society requires frank intellectual exchange. Academic freedom protects this type of free exchange and is thus essential to any university's mission.

Moreover, academic freedom supports collaborative work in the pursuit of truth and the dissemination of knowledge in an environment of inquiry, respectful debate, and professionalism. Academic freedom is not limited to the classroom or to scientific and scholarly research, but extends to the life of the university as well as to larger social and political questions. It is the right and responsibility of the university community to engage with such issues.

Course Schedule (subject to change)

Module	Topic	Zoom @ 5:30pm	Assignment	CACREP Stds.
1 (week 1-2) 08/21 – 09/03	PPT 1: Quantitative Research, Variables, Scales, Measures of Central tendency, Dispersion, Normal distribution, Shape, z-scores	08/23 08/30	Assignment #1 due 09/03	6.B.4.a.
2 (week 3-5)* 09/05 – 09/24	***09/04 Labor Day. No Class.** PPT 2: Population /Sample, Inferential/Descriptive Statistics, Sampling Distribution, Standard error of the mean (SEM), Confidence Interval, Hypotheses, NHST, Test Statistics, Type-I and II errors, Power, Effect Sizes	09/06 09/13 09/20	Assignment #2 due 09/24 Quiz 1 (available 9/22-9/24)	6.B.4.b.
3 (week 6-7) 09/25 – 10/08	PPT 3: Independent t-test, Paired-sample t-test	09/27 No Zoom on 10/04	Assignment #3 due 10/08	
4 (week 8-10) 10/09-10/29	PPT 4: One-way ANOVA, BonFerroni Correction, Way/Level, Between/Within, F-ratio, Assumptions, test of assumptions, ANOVA terms/Tables, Post hoc	10/11 10/18 10/25	Assignment #4 due 10/29 Quiz 2 (available 10/27-10/29)	
5(week 11-12) 10/30-11/12	PPT 5: Bivariate Relations, r, R^2, Correlation coefficient	11/01 11/08	Assignment #5 due 11/12	
6(week 13-16) 11/13-12/10*	***Week 14 Student Holiday** PPT 6: Regression, Line of best fit, Standardized and unstandardized regression coefficient, Regression Equation	11/15 11/29 12/06	Assignment #6 due 12/10 Quiz 3 (available 12/08-12/11)	

The readings and materials are posted on Canvas course portal under "Modules".