**Syllabus**

**Course Number:** ERMA 8320

**Course Title:** Design and Analysis in Education III

**Semester:** Fall 2022

**Credit Hours:** 3 credit hours

**Prerequisites:** ERMA 7300/7306, ERMA 7310/7316

**Meeting Time:** Tuesdays 5:00~8:00

**Instructor:** Chih-hsuan Wang, PhD (wangchi@auburn.edu)

 334-844-7986; 4010 Haley Center

 wangchi@auburn.edu

**Office Hour:**  Virtual or Wednesday 10-12, please make an appointment

**Date Syllabus updated:** August 2022

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**Texts:**

Mertler, Craig A., & Vannatta, Rachel A. (2021). *Advanced and Multivariate Statistical Methods: Practical Application and Interpretation (7th ed.)*. Routledge. (ISBN:978-0367497477)

Meyers, L. S., Gamst, G., & Guarino, A. J. (2016). *Applied Multivariate Research: Design and Interpretation (3rd ed.)*. Sage Publications, Inc.

**Recommended:**

American Psychology Association (2019)*. Publication Manual of the American Psychological Association (7th ed.)*. Washington D.C., American Psychological Association.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis (6th ed.).* Upper Saddle River, NJ: Person Education.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics (5th ed.).* Boston, MA: Pearson Education.

**IMPORTANT:**

1. All course materials (syllabus, PPTs, lab assignments and data files, rubrics…etc.) will be available on Canvas. Check the Canvas site weekly for announcements, assignments, and information before each class. I am not going to provide hard copies.
2. Our class will be delivered in both F2F and Online format. You can access our class Zoom room through Canvas class page or just join the Zoom room type in Zoom ID # 896 2123 8154.
3. If you enroll in the F2F class, you are expected to be either in the class or Zoom in synchronously. If you enroll in the Distance class, you are encouraged to join us synchronously, but you can also complete your course work asynchronously.
4. I will not accept the work completed by hand unless it is the only way to do it.

**Technology & Computer Software Requirements:**

1. Access to high-speed internet through smart mobile device or computers.
2. SPSS version 26/27/28. If you have a university own desktop/laptop, you can request a copy of SPSS from OIT Help Desk at the LRC. If you are in campus, you will be able to access SPSS at computer labs in Haley Center. However, if you are not nearby the campus, **you need to purchase or rent a copy of SPSS. You can find additional information here:** [**https://www.ibm.com/us-en/marketplace/spss-statistics-gradpack/details**](https://www.ibm.com/us-en/marketplace/spss-statistics-gradpack/details). **Remember to get the Grad Standard Pack instead of Base Pack.** I will not accept the work completed by hand calculation unless it is the only way to do it. It is okay to use previous version of SPSS.
3. You can use other statistical software/package, such as SAS, R, STATA, or Python, to complete your work. However, I only introduce SPSS in our class.
4. Microsoft Office Word.
5. PDF file creator (e.g. Adobe Acrobat).
6. Zoom application. You can install it in your computers, tablets or smartphones. This is for participating virtual office hours.

**Other Prerequisite Skills:**

 Students taking this class are expected to be able to perform the following basic skills **at the beginning** of the class:

1. **Computer basic skills**: open, save, copy-paste, use track changes, make tables and create the Word and PDF documents.
2. **Online learning platform basic skills**: open, download, and upload documents, review documents and video clips online, and **review instructor feedback on the Canvas. (More student resources for Canvas can be found here:** <http://wp.auburn.edu/biggio/canvas/student-help/> )

**Course Description:**

This course is designed to provide students the understanding of statistical methods pertaining to the design and analysis of educational research. Various Multivariate techniques will be presented, including logistic regression, Multivariate Analysis of Variance (MANOVA), Canonical correlation, Discriminate function analysis (DFA), Factor Analysis (EFA and CFA), and Path Analysis. This course emphasizes the conceptual application of statistics with some emphasis placed on the mathematical derivation of the formulas to facilitate understanding of the statistics. A part of the course will be learning SPSS to analyze data and interpret outputs.

**Course Objectives:**

Students will:

* Gain an understanding of multivariate procedures.
* Apply knowledge of multivariate procedures by analyzing research problems and making decisions about the appropriate use of these procedures.
* Apply knowledge of multivariate analyses using SPSS. (Technology)
* Apply knowledge of multivariate procedures by interpreting results of statistical analyses.
* Interpret the results of the analyses in terms of the research hypothesis.

**Course Requirements:**

* Attend all class sessions and participate in class discussions and activities
* Complete all assignments
* Complete a final project.

**Grading and Evaluation Procedures:**

Assignment (50 pts \* 6) 300 pts

 Final Project 100 pts

Total Possible Points 400 pts

* Any assignment presented or turned in late will be penalized 5% for each day past the assignment deadline. Assignments more than 2 weeks overdue will not be accepted.
* You can check your grade for each assignment you submitted in the Canvas. However, I keep the official grades in an Excel file and will calculate your final grade using Excel or SPSS.

**Grading Scale:**

|  |  |
| --- | --- |
| **Grade** | **Points** |
| **A** | ***360+ points and excellent attendance and participation*** |
| **B** | ***320-359 points and at least good attendance and participation*** |
| **C** | **280~319 points** |
| **D** | **240~279 points** |
| **F** | **<240 points** |

**Course Requirements/Evaluation**

* Learning Methods

Lectures, discussions, readings, class/lab activities, and assignments.

* Student Assessment

 Assignments (6 assignments) 50 points each

 Final Project 100 points

* Class Activities

Class activity is designed to introduce you to the use of SPSS to complete analyses taught in class. Due to time restraints, it is NOT intended to provide you with enough practice to memorize procedures. You should have reference books to help you complete analyses via SPSS when you do are completing analyses on your own.

* Attendance

Points are not attached to attendance directly. However, excellent class attendance is expected. If you need to be absent for school or work-related requirements, illness, or an emergency, you are allowed to make up points for no more than two classes. Students are responsible for initiating arrangements for missed work.

* Assignments (50 points each, 300 points in total)
1. Data Screening
2. Logistic Regression
3. Discriminant function analysis
4. MANOVA
5. Exploratory factor analysis and internal consistency reliability
6. Confirmatory factor analysis
* Working Together on Assignments

You may work together on assignments, and are encouraged to do so, unless otherwise instructed. However, you must write up your assignment independently using your own words.

* Final Project (100 points)

Pick **one** from these two options:

***Option #1:*** Select a research article in a journal from your field which uses one of the multivariate statistical methods we discussed in this class. Write short descriptions of the research purpose, list all research questions, and summarize data analysis methods and results for each research question. Provide your assessment of the scope and validity of conclusions. The report should be double spaced and not exceed 7 pages.

***Option #2:*** If you have a dataset, and the questions related to this dataset are in a multivariate setup, write short descriptions of your study related to this dataset and list your research question(s). Specify which multivariate data analysis method(s) you are going to use to answer your research question(s). Analyze the dataset and answer your research question(s). Provide your conclusion to the study. The report should be in APA format and not exceed 7 pages.

**Class Policy Statements**

* ***Email and Communication***
* All communication through emails needs to be via Auburn Tiger Email system. In other words, you need to use your university email address to send me emails, and I will do the same. Emails will be responded **within 48 hours** **excludes weekends and holidays.**
* All PPTs and announcements will be posted in the Canvas at the beginning of each week. You are responsible to check the Canvas every week.
* All assignments need to be uploaded in the Canvas. I will grade your assignments in the Canvas. **You can check your grade and my feedback for each assignment in the Canvas as well.** However, I keep your official grades in my Excel file.
* If you need individual help, you can reach me during the office hours, email, or make an appointment (request Zoom meeting).
* ***Class Attendance*** (weekly Canvas login record)

Points are not attached to attendance directly. However, in order to explore topics effectively, attendance and class participation are essential. Excellent class attendance is required to earn an A and to earn lab or other PPT activities points. If you need to be absent for school or work related requirements, illness, or an emergency, you are allowed to make up points for no more than two classes. Students are responsible for initiating arrangements for missed work.

* ***Assignment Policy***
* Due to the potential incompatibility of word processing programs and formats, and the potential for the transmission of viruses, absolutely no work for the course will be accepted as an E-mail and/or as an E-mail attachment, or on a disk etc. All graded work must be submitted through Canvas.
* All work submitted for the course must be typed.
* ***Late Assignments Policy***
* Assignments turned in late will receive a 5% reduction in earned points per day. The only exception will be in the case of emergency.
* Assignments more than 2 weeks overdue will not be accepted.
* Except for work requiring calculations, all work must be typed or it will **not** be graded. Late penalty will be applied to work completed in writing and then turned in late in typed format for a grade.
* ***Incompletes and Withdrawals***
* Grades associated with incomplete course work or withdrawal from class will be assigned in strict conformity to University policy (see Auburn University Bulletin). If you wish to drop this course you may do so by the 10th class day with no grade assignment. From the 10th class day to mid-quarter a W (withdrawn-passing) grade will be recorded in your transcripts. After this period withdrawal from the course will only be granted under unusual circumstances and must be approved by the Dean of the College of Education.
* Note that the incomplete grade (IN) policy is in effect. The new policy requires that students complete a form requesting that an IN grade be assigned. If this form in not completed and given to the instructor of the class, a grade will be assigned with a score of zero (0) for work that has not been completed and turned in by the time the instructor reports grades. To be eligible for a grade of IN, the student must have completed and have passed more than half of all class assignments/exams for semester.
* ***Academic Misconduct***

**Academic Honesty**

The Department of EFLT recognizes university policy regarding academic misconduct. Violations include, but are not limited to: plagiarism, unauthorized assistance during examinations, submitting another’s work product as your own, using another’s words as your own without appropriate citation, sharing unauthorized materials with another that contain questions or answers to examinations, altering or attempting to alter assigned grades. **In accordance with University policy regarding academic misconduct, students may be subject to several sanctions upon violations of the Student Academic Honesty Code.** See the Tiger Cub publication for the current year for specifics regarding academic misconduct as well as student’s rights and responsibilities associated with the Code.

**Plagiarism**

For more information, see:

<http://www.collegeboard.com/student/plan/college-success/10314.html>

<http://owl.english.purdue.edu/owl/resource/589/01/>

<http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml>

* ***Disability Accommodations***

Students who need special accommodations in class, as provided for by the American Disabilities Act, should arrange a confidential meeting with the instructor during office hours the first week of classes — or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. You must bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have these forms but need accommodations, make an appointment with the Program for Students with Disabilities, 1228 Haley Center, 844 2096 (V/TT).

**Tentative Course Content and Schedule**

| **Week** | **Date** | **Topic** | **Reading**  | **Assignment Due** |
| --- | --- | --- | --- | --- |
| 1 | 8/16~8/21 | Syllabus & Introduction | Mertler: Ch 1 |  |
| 2 | 8/22~8/28 | Pre-Analysis Data Screening | Mertler: Ch 3Meyers: Ch 3  | Assignment #1 Data Screening |
| 3 | 8/29~9/4 | Review Correlation, RegressionCanonical Correlation | Mertler: Ch 7Meyers: Ch 4& 5 |  |
| 4 | 9/5~9/11 | Logistic Regression | Mertler: Ch 11Meyers: Ch 6 | Assignment #2 Logistic Regression |
| 5 | 9/12~9/18 | Discriminant Function Analysis | Mertler: Ch 10Meyers: Ch 7 |  |
| 6 | 9/19~9/25 | Discriminant Function Analysis | Mertler: Ch 10Meyers: Ch 7 | Assignment #3 DFA |
| 7 | 9/26~10/2 | Review ANOVAHotelling’s T2 | Mertler: Ch 6Meyers: Ch 8 & 9 |  |
| 8 | 10/3~10/9 | MANOVA/MANCOVA | Mertler: Ch 6Meyers: Ch 10 & 11 | Assignment #4 MANOVA |
| 9 | 10/10~10/16 | Exploratory Factor Analysis | Mertler: Ch 9Meyers: Ch 12 |  |
| 10 | 10/17~10/23 | Exploratory Factor Analysis | Mertler: Ch 9Meyers: Ch 12 | Assignment #5 EFA |
| 11 | 10/24~10/30 | Reliability AnalysisInstrument/measure issues |  |  |
| 12 | 10/31~11/6 | Confirmatory Factor Analysis | Meyers: Ch 13 |  |
| 13 | 11/7~11/13 | Confirmatory Factor Analysis | Meyers: Ch 13 | Assignment #6 CFA |
| 14 | 11/14~11/20 | Path Analysis | Mertler: Ch 8Meyers: Ch 14 |  |
| 15 | 11/21~11/27 | Happy Thanksgiving! |
| 16 | 11/28~12/4 | Final Project Due (Due on Tuesday, 11/30/2022) |

Mertler, Craig A., & Vannatta, Rachel A. (2016). *Advanced and Multivariate Statistical Methods: Practical Application and Interpretation (6th ed.)*. Pyrczak Publishing, Los Angelas.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2016). *Applied Multivariate Research: Design and Interpretation (3rd ed.)*. Thousand Oaks, CA: Sage Publications, Inc.

NOTE: This is a tentative syllabus. Any changes will be announced in class. Students are responsible for being aware of the changes made.