

National Chiayi University Course Syllabus, Fall Semester, Academic Year 106

Course code	10612600004	Course level	Master
Course title	Advanced Educational Statistics	Instructor	李茂能
Credits(Course Hours)	3.0 (3.0)	Class	Global Master Program of Teaching Profession Grade 1 Class A
Prerequisite Courses		Required/ Elective	Elective
Class location	教育館 B03-214	Class Language	English
Availability of certificate	無	Office hour	
Syllabus url	https://web085004.adm.ncyu.edu.tw/Syllabus/Syllabus_Rpt.aspx?CrsCode=10612600004		
Remark	<p>The instruction method adopts a learner-centered or question-oriented approach, where in-class time is dedicated to self-exploring topics in greater depth and creating rich learning opportunities, where how-to learn is more important than what to learn. As a result, you as a student is actively involved in knowledge construction and evaluate your learning in a manner that is personally meaningful. As a result, your learning outcome will be perpetual and your learning process will become a life-long process. What is more important, your learning is fun and without boundary. You can pick up as much as you want according to the instructor's guided questions/topics.</p>		
Is the topic,content or activity of this course is relevant to issues of sex equality? No	Are materials or books used in this course original? Yes		

>> Goals at the Department or Institute level	
<p>本學程以招收外國大學教育相關領域之畢業生為對象，採全英語授課。本學程之教育目標旨在培養具備專業、創新、多元、關懷、領導五大基本素養之國際教學專業領導人才。</p>	
>> Core abilities	Relationship
1.深厚的教學理論基礎	Moderately related

2.運用教學科技的能力	Strongly related
3.教學議題的研究能力	Highly related
4.多元文化觀點與關懷學生的情操	Moderately related
5.教學專業領導與溝通能力	Moderately related

>> Course objectives

- 1.Warm up fundamental concepts of descriptive statistics via on-line self-learning
- 2.Be able to explain the basic concepts underlying univariate inferential statistics(t-test or ANOVA) via www resources(such as on-line open courses)
- 3.Be able to produce statistical plots or to conduct analyses of data sets using SPSS
- 4.Be able to interpret the findings from quantitative research in education and psychology

>> Course schedule

Week	Theme or topic	Content	Teaching method
01 09/20	Course orientation What is Applied Statistics?	course objectives learning methods: how to learn what to learn learning assessment	Operation/Practice, Lecture, Discussion.
02 09/27	Basic skills for SPSS operations: Data analysis and plots using SPSS How to read a statistical table correctly?	Frequency polygon Histogram Bar chart Stem-leaf plot Pie-chart SPSS hands-on exercises SPSS output interpretation	Assignment/Exercise, Operation/Practice, Lecture, Discussion.
03 10/04	Measures of variability Normal distribution and standard scores Measures of relative position What is norm?	range standard deviation Characteristics of the normal curve z-score/t-score/others Percentiles	Assignment/Exercise, Operation/Practice, Lecture, Discussion.

		Percentile Ranks SPSS hands-on exercises	
04 10/11	Measures of central tendency	Descriptive/Inferential statistics measurement scales the mean the mode the median SPSS hands-on exercises	Assignment/Exercise, Operation/Practice.
05 10/18	What is Sampling distribution? What is CLT?	Basic concepts: standard error of the mean Central limit theorem & simulations using SPSS command syntax	Assignment/Exercise, Operation/Practice, Lecture, Discussion.
06 10/25	What is Null hypothesis? What is Alternative hypothesis? Two types of errors	Why we need it? How to write Ho & H1? Type-I error Type-II error	Lecture, Discussion.
07 11/01	Confidence interval & hypothesis testing What is Power?	How to compute CI for a given confidence level? What are the advantages over the Null hypothesis? Power and sample size	Assignment/Exercise, Operation/Practice, Lecture, Discussion.
08 11/08	z/t distributions & related z/t tests	z distribution t distribution basic assumptions their uses in educational settings	Lecture, Discussion.
09 11/15	sample size planning Power & Effect Size	Why sample size planning is important? its relation to power Why effect size is so important in inferential statistics? Gpower's application of sample size planning	Assignment/Exercise, Operation/Practice, Lecture, Discussion.
10 11/22	Warm up Q & A Open Book Quiz	This would conclude the introduction about descriptive Statistics.	Assignment/Exercise, PBL, Operation/Practice, Discussion.

11 11/29	<p>What p-value is ?</p> <p>What it's not?</p> <p>What is alpha?</p> <p>Are alpha & p identical?</p>	<p>How to tell apart alpha & p-value?</p>	<p>Assignment/Exercise, Operation/Practice, Lecture, Discussion.</p>
12 12/06	<p>Inference about correlation coefficients</p> <p>How to correctly interpret them?</p>	<p>Pearson-product moment coefficient</p> <p>Phi coefficient</p> <p>Rank coefficient</p> <p>Kendall coefficient of concordance</p> <p>computation using SPSS</p> <p>SPSS output interpretation</p>	<p>Assignment/Exercise, Operation/Practice, Lecture, Discussion.</p>
13 12/13	<p>Simple linear regression for prediction</p>	<p>definition of simple linear regression and its purposes</p> <p>computation using SPSS</p> <p>SPSS output interpretation</p>	<p>Assignment/Exercise, PBL, Operation/Practice, Lecture, Discussion.</p>
14 12/20	<p>χ^2 test for goodness of fit, association, homogeneity, and independence & post hoc comparisons</p>	<p>test of goodness of fit</p> <p>test of homogeneity of proportions</p> <p>computation using SPSS</p> <p>SPSS output interpretation</p>	<p>Assignment/Exercise, Operation/Practice, Lecture, Discussion.</p>
15 12/27	<p>χ^2 test for association, and independence & post hoc comparisons</p>	<p>test of independence</p> <p>test of significance of change</p> <p>computation using SPSS</p> <p>Excel VBA introduction(a self-developed macro for post hoc comparisons)</p>	<p>Assignment/Exercise, Operation/Practice, Lecture, Discussion.</p>
16 01/03	<p>Inference about one population mean and its confidence interval</p> <p>Warm-up:What is CLT?</p>	<p>standard error of the mean</p> <p>z/t-tests for a pupolation mean</p> <p>z/t-tests for a pupolation correlation</p> <p>The Chi-squared-test for a population proportion</p> <p>SPSS output interpretation</p>	<p>Assignment/Exercise, PBL, Operation/Practice, Lecture, Discussion.</p>
17 01/10	<p>Inference about two population means and its confidence interval</p> <p>Introduction to one-way</p>	<p>The z/t-test for differences between two means</p> <p>The z/t-test for differences between two correlations</p> <p>The Chi-squared-test for differences between two proportions</p>	<p>Assignment/Exercise, PBL, Operation/Practice, Lecture, Discussion.</p>

	ANOVA	Basic assumptions of ANOVA What is One-way ANOVA? Post hoc comparisons SPSS output interpretation	
18 01/17	Introduction to multiple regression Journal article review on a given self-selected topic	oral presentation self-learning feedback	Assignment/Exercise, Oral presentation.

>> Course requirements

This statistics course, designed under a question-directed learning environment, will be conducted using teacher-directed learning topics and on-line self-instructed learning modules of activities. The way of learning in our class will be individualized, dynamic, and interactive. In order to get you involved more in the active learning, the typical teacher's lecturing in a class and the student's doing homework at home for our class will be sometimes flipped. Youtube video lectures or other formats (such as PDFs or PPTs picked by the instructor or students) taken from WWW are viewed by students at home before the class session, while in-class time may be mostly devoted to exercises, projects, or discussions of pre-setup questions. The video lectures on a specific topic on statistics is either created by the instructor and posted online in time or selected from an online repository of Youtube. The instructor decides what students need to learn and what materials students should explore on their own before coming to class.

Before you attend each class, be sure to watch videos of given lectures identified on the Web or recommended by the instructor. Each lecture may come with a brief in-class quiz that offers you an immediate feedback on whether you miss any essential points.

>> Grading policy

Participation in discussion 10%

Quiz 10%

Essay 20%

Oral presentation 30%

Operation/Practical 10%

Assignment/Exercise 20%

>> Text books and learning resources

1. Cumming, G. (2012). Understanding the new statistics: Effect sizes, confidence intervals, and meta-analysis. New York: Routledge.

2. Cumming, G. (2014). The New Statistics: Why and How. Psychological Science, 25, 7-29. <http://tiny.cc/tnswhyhow>

3.林清山(2000)。教育與心理統計學。臺北: 東華。

4.Kinney, P. R. & Gray, C. D.(2004). SPSS 12 made simple [electronic resource]

5.Cohen, J. (1992). A power primer. Psychological Bulletin, 112(1), 155-159.

6.Hopkins, Glass, & Hopkins,(1995). Basic Statistics for the Behavioral Sciences, 3rd Edition. Englewood Cliffs, NJ:Prentice-Hall.

7.Pallant, J.(2010).SPSS Survival Manual : A step by step guide to data analysis using SPSS.Open University Press

**For YouTubes,

(1)<https://www.youtube.com/watch?v=EQWrgXo5tOs> for descriptive statistics

(2) search for 'Geoff Cumming' to find 11 videos about the new statistics

(3)<http://www.psychologicalscience.org/index.php/members/new-statistics>

>> Teaching materials

[統概.ppt](#)

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1.Please respect the intellectual property right and using authorized textbooks. Book piracy is not allowed.

2.Recognize the importance and significance of gender equity in education. Consult university regulations for its policy. Promote gender equity by illustrating the concept in classes and provide proper consultation to students.