

**EDF 5402-01**  
**Analysis of Variance**  
Fall 2009  
Department of Educational Psychology & Learning Systems  
Florida State University

**Instructor:** Mustafa Kuzey Bilir, Ph.D.

**TA:** Kyunghwa Cho

**Class hour:** M/W 9:30 am - 10:45 am

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1:30-3:30 pm Friday

**Office hours:**

Monday 11:00am-12:30 pm

Thursday 11:30am –1:00pm or by appointment

### Course Description

This course introduces students to techniques of data analysis and statistical inference commonly used in educational and psychological research. Students will conduct analyses using the NELLS:88 data base and other data sets, with SPSS or SAS. The major topics are one- and two-factor analysis of variance with multiple comparisons and interactions, randomized block and within-subjects designs, and analysis of covariance.

Knowledge of basic algebra is required, as is an understanding of the fundamental principles of descriptive statistics and hypothesis testing (as taught, for example, in EDF 5400 or equivalent). Knowledge of calculus is not required.

In most of our analyses we will use samples drawn from a real, large-scale study of education. The NELLS:88 (National Education Longitudinal Study of 1988) data base is one of the largest and most important collected by the U.S. government, including extensive measurements of students' beliefs, aspirations, attitudes, and background, as well as related information from teachers, parents, and schools.

### Text Books

Required: Howell, D.C. (1997). *Statistical Methods for Psychology* (5<sup>th</sup>, 6<sup>th</sup> or 7<sup>th</sup> ed.). Pacific Grove, CA: Duxbury.

Recommended: Kirk (1995). *Experimental Design: Procedures for the Behavioral Sciences*. 3rd ed. Pacific Grove, CA; Brooks/Cole.

## Course objectives

By the end of the course the student should have demonstrated the ability to:

1. identify continuous and discrete (or categorical) variables as either dependent or independent, and choose appropriate statistical procedures for their analysis;
2. describe relationships between predictor variables and a continuous outcome variable;
3. formulate one- and two-factor between-groups analysis-of-variance models, as well as split-plot and randomized blocks models, estimate their parameters, and test hypotheses about those parameters; including
  - a. identify situations in which it is correct to apply the parametric ANOVA and the Kruskal-Wallis one-way ANOVA,
  - b. identify the assumptions underlying parametric and nonparametric ANOVA,
  - c. differentiate between fixed and random effects models,
  - d. identify situations in which various transformations are appropriate for ANOVA,
  - e. compute and interpret effect size indicators for the analysis of variance,
  - f. complete power calculations for the analysis of variance.
4. design and implement tests of specific a priori and post hoc contrasts in the context of analysis of variance models; specifically
  - a. identify and differentiate between comparison and family-wise error rates,
  - b. describe when a priori and post hoc comparisons are appropriate,
  - c. compute planned and post hoc comparison procedures, and
  - d. identify the various post hoc comparison procedures (Tukey's HSD, the Ryan procedure, the Scheffe test, Dunnett's tests), and conditions wherein each procedure is appropriate.
5. delineate assumptions of linear statistical models and examine data to evaluate their conformity to those assumptions;
6. recognize similarities and differences between regression and analysis-of-variance models;
7. identify and control sources of error through experimental design and statistical adjustment;
8. identify observations which may be dependent, and explain the limitations of ordinary techniques for these data;
9. write coherent summaries and interpretations of data analyzed by the above procedures.

## Course website and email

A course website has been set up through the Blackboard (Bb) System. Lecture notes (mostly powerpoint files), assignments and other resources will be available from this web site. As needed, course-related announcements will be posted on the course website. By default, only

announcements posted the same day are displayed on the opening page. Therefore, get in the habit of clicking on the tab within the announcements page that displays announcements posted during the last 7 days.

Any course-related e-mail that I initiate will be sent to your e-mail address listed on the Blackboard system (this is usually your garnet account, by default). If you don't check your garnet mail often, please set up a preferred alternate address on the Blackboard system or arrange automatic forwarding service from your Garnet account to a preferred alternate address.

## Grades

Grades will be based on points accumulated on assignments and examinations. There will be 100 total possible points, distributed as follows:

Homework assignments*	50%
Midterm exam (scheduled time only)	20%
Final exam (scheduled time only)	30%

\*Students may turn in assignments in groups of two.

## Assignments

Four assignments will make up the points devoted to homework. Each item on homework will be worth 5 points unless noted otherwise, and the assignments are not all equal in length. Total homework points will be converted to a percentage score, then weighted and combined with exam scores to obtain a final overall grade. As for my other classes you are encouraged to work on your homework assignments in groups of two-each team of students should turn in a single copy of the group homework with all names listed. However, answers **MUST** be written independently from students in other groups. Any violation to this requirement, including exchanging answers, will be considered as violation of the Academic Honor Code of FSU.

**If you would like to appeal any grade on your homework you must make the appeal in writing to the teaching assistant who graded your paper. You must wait at least one day after the homework has been returned to you.**

Each student is given a total of 4 late days that can be used throughout the semester without any consequence to the final grade. You may use one late day on each assignment, or all 4 days on one assignment. If more than 4 late days are accumulated, it will affect your final course grade, as described below. One exception is that **NO POINTS** will be given for any homework turned in after answer sheets are distributed. Late homework should be turned in during business hours to one of the EPLS secretaries, who will record that it has been received.

<i>Number of late days</i>	<i>Consequences</i>
5 – 7	Final percentage grade reduced by 5 points (e.g., 100 points to 95 points)
8 - 10	Final percentage grade reduced by 10 points (e.g., 100 points to 90 points)
11 or more	Possible failure.

**Exams**

The midterm exam will be taken during class time. Final exam during the regular class time on Monday 12/7. Both this test and the final exam are open-book and open-note, and on both exams you may use calculators. However, books, notes, and calculators may NOT be shared during exams, so be sure to bring your own materials!

**Software Use**

This course will require the use of SPSS. SPSS is general statistical package software and available on many lab computers on campus, including LRC lab in Stone building.

**Honor Code**

Students at FSU are expected to uphold the Academic Honor Code published in The Florida State University Bulletin and the Student Handbook and found online at <http://dof.fsu.edu/honorpolicy.htm>. The Academic Honor System of The Florida State University is based on the premise that each student has the responsibility (1) to uphold the highest standards of academic integrity in the student's own work, (2) to refuse to tolerate violations of academic integrity in the university community, and (3) to foster a high sense of integrity and social responsibility on the part of the university community. Academic dishonesty, including copying and plagiarism, may result in failure of this course.

**Students with Disabilities**

Students with disabilities needing academic accommodation should (1) register with and provide documentation to the Student Disability Resource Center; and (2) bring a letter to your instructor indicating the need for accommodation and describing the type of accommodation needed. This should be done during the first week of class.

**Schedule (subject to change)**

<b>Week</b>	<b>Topics</b>	<b>Readings</b>	<b>Due</b>
1 8/24	Plan for the course [Syllabus, EDF 5402 overview]	H 1-8 K 1-3	

1 8/26	Analysis of variance (ANOVA): One-way model, [One-way Part 1]	H 11.1-6 K 1-3	
2 8/31			
2 9/2	Tests in ANOVA, assumptions [One-way Part 1]	H 11.7-8 K 1-3	
3 9/7	Labor Day No Class		
3 9/9	Tests in ANOVA, assumptions [One-way Part 1]	H 11.7-8 K 1-3	
4 9/14-16	ANOVA EMS, power, and transformations [Power, One-way Part 2]	H 11.9-13 K 1-3	
5 9/21-23	Multiple comparisons (MCs): Error rates and planned comparisons [MC Part 1]	H 12.1-4 K 4-5	HW 1 due 9/21
6 9/28-30	More on MCs: Post-hoc methods, trend tests [MC Part 2]	H 12.5-13 K 4-5	
7 10/5-7	Two-way ANOVA, interactions [Two-way]	H 13.1-4 K 9	
8 10/12-14	MC for two-way; Simple effects tests [Simple]	H 13.5-13 K 9	
9 10/19-21	Review for exam, midterm		HW 2 due 10/14 Midterm exam 10/21
10 10/26-28	Within-subjects factors (repeated measures [Within Subjects Design])	H 14.1-16 K 7, 9	
11 11/2-4	More on within subjects designs	H 14.7-13 K 7, 9	
12 11/9	Dummy variables, relation of ANOVA to regression[mranov]	H 16.1-3	HW 3 due 11/9
12 11/11	Veterans' Day No Class		
13 11/16	Dummy variables, relation of ANOVA to regression[mranov]	H 16.1-3	
13 11/18	FERA Conference, by TA or no class		
14 11/23-25	Analysis of covariance (ANCOVA) [ancova]	H 16.5-6 K 12	
15 11/30- 12/4	More ANCOVA, nonparametric analogues to ANOVA [ancova plus, npar]	H 16.7-9, 18 K 12	HW 4 due 11/30
Final Exam is scheduled at 9:30-10:45 am on December 7, Monday			

Note: The square brackets for each day give the names of files that are relevant to that day's lecture. Most of these are acrobat pdf files that will be posted on Bb.