EXS 612 ADVANCED STATISTICAL APPLICATIONS IN EXERCISE SCIENCE
SUNY Cortland
Kinesiology Department

Course Information
Credit Hours: 3.0
Semester/Year: Fall 2012
Class Location: PRST 1135
Texts Required:
    Thomas, J. R., Nelson, J.K., & Silverman, S. J. (2011). *Research methods in physical activity* (6th ed.). Champaign, IL: Human Kinetics.
    Leech, N.L., Barrett, K.C., & Morgan, G.A. (2011). *IBM SPSS for Intermediate Statistics* (4th ed.). New York: Routledge.
Text – Recommended
    American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

Professor Information
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    Others by appointment please
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School of Professional Studies Dean's Office:
    Dr. John Cottone, Dean
    Dr. Eileen Gravani, Associate Dean
    PRST 1175; phone: 607-753-2701(2)

COURSE DESCRIPTION:
(C) Advanced statistics with applications in exercise science. Content includes a review of basic descriptive and inferential statistics, plus coverage of multiple-factor and repeated measures ANOVA, post-hoc tests, multivariate analysis of variance, analysis of covariance, multiple regression, canonical analysis and factor analysis. Computerized statistical analyses are imbedded throughout the course. Prerequisites: EXS 201 or MAT 201 or PSY 201 or COM 230 or ECO 221 or HLH 299 or PED 434 or equivalent. (3 cr. hr.)

COURSE ATTENDANCE POLICY:
    Class attendance is required, however, students will not be penalized for having one unexcused absence. Afterwards, there will be up to a letter-grade deduction on the final grade for each additional absence. Illness, travel, appointments, coaching obligations and court appearances are some examples of **un**excused absences. Hospitalization, death in the immediate family, away SUNY Cortland athletic contests are examples of excused absences. No handouts, notes or assistance will be given for material distributed or covered during an unexcused absence (or an excused absence without prior, written notification). *Students are 100 percent responsible for all work missed, regardless of the type of absence.* In the event of extreme winter weather, students should refer to the college home page (www.cortland.edu) in the mid afternoon to see if cancellation notices are posted. Otherwise, students should assume the classes will be held.

EVALUATION OF STUDENT PERFORMANCE:

Requirements and Evaluation:

I.	Examinations (5 quizzes at 10% each; 17% final exam)	67%
II.	Assignments	33%
Total		100%

ASSIGNMENTS: No assignments/handouts will be given out after the class session in which they were distributed, unless previous arrangements had been made. All written work will be collected at the beginning of class on the night that it is due (or by another specified date and time). No late work will be graded for credit. All work due on the day of an excused absence is still expected to be turned in on time, unless previous arrangements have been made. Each student is expected to submit his/her own work, including calculations and computer assignments (refer to the section in the *College Handbook* on Academic Dishonesty). Minimum requirements for passing course include: completion of 80% of all written work, and passing grades on at least two-thirds of the quizzes (including the final exam).

EXPECTATIONS: For student success, expectations include: coming prepared to all classes, staying up-to-date by studying all assignments and practicing with SPSS outside of class (this equates to *at least* **5-6 hours of out-of-class time between each class session, with additional time for studying before each exam**), turning in all assignments on-time, and seeking help and asking questions as soon as problems arise. SPSS practice involves creating data files, redoing class analyses and those in the text and experimenting with other options.

TECHNOLOGY: There is a computer component to this course. Students will be learning and using statistical software (SPSS) to organize and analyze data. Specific computer assignments will be required throughout the semester. Support will be provided for instruction on running the associated software. Students are encouraged to use computers (either in one of the campus computer labs or one's personal computer) to enhance the quality of their written assignments. Students are also encouraged to obtain on-campus email accounts and to frequently check their email. Announcements and reminders may be distributed via email to the class at various times throughout the semester. Occasionally in class, references to web sites will be made. Therefore, students should be familiar with how to use the Internet. Students will need to supply a flash drive (recommended, however space is available on Google Docs as well) and bring SUNY Cortland ID to class in order to print in the computer lab.

ACADEMIC INTEGRITY: The College is an academic community, which values academic integrity and takes seriously its responsibility for upholding academic honesty. All members of the academic community have an obligation to uphold high intellectual and ethical standards. For more information on academic integrity and how academic dishonesty can occur, please ask your instructor and/or refer to the *College Handbook* (Chapter 340), *Code of Student Conduct and Related Policies*, and the following web site http://www2.cortland.edu/departments/english/wrc/students/integrity.dot. All work submitted for this class must be each student's own work. Any work submitted (in part or whole) that is not unique will be considered plagiarized and will be treated as such per academic policy. This includes, but is not limited to, material retrieved from references; therefore proper documentation of cited material (using quotation marks with associated page numbers) in APA is a must!

STUDENTS WITH DISABILITIES: SUNY Cortland is committed to upholding and maintaining all aspects of the federal Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973. If you are a student with a disability and wish to request accommodations, please contact the Office of Disability Services located in Van Hoesen Hall or call (607)753-2066 for an appointment. Any information regarding your disability will remain confidential. Because many accommodations require early planning, requests for accommodations should be made as early as possible.

OBJECTIVES OF THE COURSE:

The student will be able to:
1. exhibit an understanding of statistical concepts and techniques that are consistent with contemporary and valid research in the field of exercise science.
2. effectively organize data and accurately calculate appropriate statistics for specific research applications.
3. build on past knowledge of statistics to enhance understanding and ability to make applications of various statistical techniques.
4. exhibit knowledge of how to analyze and interpret data using current appropriate technology.
5. understand the difference between planned and post-hoc comparisons and to conduct each analysis effectively to arrive at accurate conclusions.
6. develop a working knowledge of statistics to effectively interpret literature in exercise science.
7. interpret performance data in order to make appropriate and relevant conclusions.

COURSE OUTLINE:

I.   Review of Basic Descriptive Statistics
    A.   Organizing Data
    B.   Central Tendency
    C.   Variability
    D.   Correlation

II.   Comparing Means
    A.   T-tests
    B.   Factorial ANOVA
    C.   Repeated Measures ANOVA
    D.   Mixed ANOVA
    E.   Post-hoc and planned comparisons
    F.   Omega-squared

III. Relationships among Variables
    A.   Regression
    B.   Multiple Regression
    C.   Canonical Analysis

IV.   Advanced Techniques
    A.   Analysis of Covariance
    B.   Multivariate Analysis of Variance
    C.   Discriminant Analysis
    D.   Factor Analysis

V.   Research-related Measurement Issues
    A.   Reliability
    B.   Validity
    C.   Other

Tentative Course Outline

Date	Topic(s)	Assigned Readings/Assignments*
Aug. 28	Introduction	TN&S – Chapters 1 & 6 SPSS – Chapter 1, Appendix A
Sept. 4	Review of descriptive Statistics Probability Theory, T-tests	TN&S – Chapters 7 & 9 (pp. 147 - 156) SPSS – Chapters 2 & 5 (81-90, 96-99,102-105), and Appendix B (274-277)
Sept. 11	Effect Size, Correlation	TN&S – Chapter 8 (pp. 125-138) SPSS – Chapter 5 (thru 96, 99-end); App. B (282-284)
Sept. 18	Quiz 1; Multiple Regression	TN&S – Chapter 8 (pp. 139-141) SPSS – Chapter 6
Sept. 25	Multiple regression cont.	"
Oct. 2	Quiz 2; ANOVA	TN&S – Chapter 9 (pp. 158-168) SPSS – App. B (279-282)
Oct. 9	Repeated measures ANOVA	TN&S – Chapter 9 (pp. 168-171) SPSS – Chapter 9 (pp. 175-187)
Oct. 16	Factorial & Mixed ANOVA	SPSS – Chapters 8 (pp. 150-167), 9 (pp. 188 – end)
Oct. 23	Quiz 3; Nonparametrics	TN&S – Chapter 10 SPSS – Appendix B (pp. 271-273, 278-279)
Oct. 30	MANOVA	TN&S – Chapter 9 (pp. 175-178) SPSS – Chapter 10 (pp. 194-216)
Nov. 6	Quiz 4; Covariance	TN&S – Chapter 9 (pp. 171-172) SPSS – Chapter 8 (pp. 167 - end)
Nov. 13	Discriminant and Factor Analyses	TN&S – Chapter 9 (pp. 173-174), pp. 142-143 SPSS – Chapters 7 and 4
Nov. 20	Quiz 5	
Nov. 27	Power Analysis	SPSS – Chapter 5 (pp. 93-96); G*Power
Dec. 4	Issues of Reliability and Validity	TN&S – Chapter 11 (pp. 193-204) SPSS – Chapter 3
Dec. 11	Final Exam	

*TN&S refers to Thomas, Nelson & Silverman (2011); SPSS refers to Leech, Barrett & Morgan (2011) text.
 Additional readings and articles may also be assigned.

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EXS 612 Supplemental References

American Psychological Association (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

Atkinson, G., & Nevill, A. M. (2001). Selected issues in the design and analysis of sport performance research. *Journal of Sports Sciences, 19,* 811-827.

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Baumgartner, T.A., & Hensley, L.D. (2013). *Conducting and reading research in health and human performance* (5th ed.). New York: McGraw-Hill.

Biddle, S.J.H., Markland, D., Gilborne, D., Chatzisarantis, N.L.D., & Sparkes, A.C. (2001). Research methods in sport and exercise psychology: Quantitative and qualitative issues. *Journal of Sports Sciences, 19,* 777-809.

Blackwell, E., Mendes de Leon, C. F., & Miller, G. E. (2006). Applying mixed regression models to the analysis of repeated-measures data in psychosomatic medicine, *Psychosomatic Medicine, 68,* 870-878.

Brace, N., Kemp, R., & Snelgar, R. (2009). *SPSS for psychologists* (4th ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

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Cohen, J. (1990). Things I have learned (so far). *American Psychologist, 45*, 1304-1312.

Cohen, J., & Cohen, P., West, S.G., & Aiken, L. S. (2003). *Applied multiple regression/Correlation analysis for the behavioral sciences* (3rd ed.). St. Paul, MN: Assessment Systems Corp.

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Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191.

Ferguson, C.J. (2009). An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice, 40* (5), 532-538.

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Washington, DC: Sage.

Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research, 26,* 499-510.

Hatfield, B. D., & Landers, D. M. (1978). Observer expectancy effects upon appraisal of gross motor performance. *Research Quarterly, 49*, 53-61.

Hopkins, K. D., Hopkins, B. R., & Glass, G. V. (1995). *Basic statistics for the behavioral sciences*. Boston: Allyn & Bacon.

Keppel, G., & Wickens, T. (2004). *Design and analysis: A researcher's handbook*. Englewood Cliffs, N.J.: Prentice-Hall.

Kerlinger, F. N., & Pedhazur, E. J. (1973). *Multiple regression in behavioral research*. New York: Holt, Rinehart and Winston.

Liu, Y. (2002). Analyzing RM ANOVA related data using SPSS 10. *Measurement in Physical Education and Exercise Science, 6,* 43-60.

Locke, L.F., Silverman, S.J., & Spirduso, W.W. (2004). *Reading and understanding research* (2nd ed.). Thousand Oaks, CA: Sage Publications.

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Odom, L. R., & Morrow, J. R., Jr. (2006). What's this r? A correlational approach to explaining validity, reliability and objectivity coefficients. *Measurement in Physical Education and Exercise Science, 10(2),* 137-145.

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