Course and Contact Information

Instructor: Gregory J. Feist
Office Location: DMH 313
Telephone: (408) 924--5617
Email: greg.feist@sjsu.edu
Office Hours: T TH noon to 1pm
Class Days/Time: T TH 9-10:15am
Classroom: Clark 303A
Prerequisites: Stat 245

Course Information/Description

This course introduces several of the most common multivariate procedures: multiple regression and correlation (MRC), logistic regression, and analysis of covariance (ANCOVA), multivariate analysis of variance and covariance (MANOVA & MANCOVA), principal components (PCA) and factor analysis (FA), structural equations modeling (SEM). We will also briefly go over the general linear model (GLM). Leading to the discussion of these topics are extremely brief reviews of Pearson correlation and analysis of variance (ANOVA) - this course assumes you have learned these procedures in previous courses. We're going to cover a fair amount of somewhat complex material relatively quickly. You must have taken Stat245 to enroll in this course.

As the primary goal of this course is to help you become an informed consumer and practitioner of research by being comfortable with data, we'll address these statistical procedures from a conceptual approach. Rather than getting caught up in their mathematical (i.e., matrix algebra) foundations, we'll focus on application and interpretation. For each procedure, we will cover three basic questions: what is it, why/when might one use it, and how might one appropriately conduct, interpret, and communicate it. More specifically, for each procedure we'll address the following:

• defining the procedure (what is it)
• describing research situations where the procedure may be appropriate (why and when use it)
• discussing underlying requirements and assumptions of the procedure (how use it appropriately)
• conducting the analysis using computer software packages (how to conduct the analysis)
• interpreting computer output (how to interpret the analysis)
• identifying and addressing issues and problems that may arise in using the procedure
• communicating the results of the analysis in standard APA format (how to communicate the analysis)

A critical component of the class is the use of statistical software to conduct the procedures covered. As SPSS is the most popular and readily available software, we'll use it to create and execute files that
define data and conduct statistical analyses. We’ll go over the output generated from these analyses during class.

Faculty Web Page and MYSJSU Messaging

Unless otherwise announced in class, all graded assignments will be accepted only in electronic form using the Canvas learning management system assignments page (Canvas is available at https://sjsu.instructure.com/). Having access to the Internet is your responsibility, so have backup plans in case you have problems with your primary computer. I cannot accept excuses about technology problems as valid, unless the entire University network or all of Canvas is offline.

Supplementary course material will be made available on Canvas regularly. Communication regarding the course will be sent via the e-mail address linked to your MySJSU account or posted to Canvas. It is your responsibility to make sure you are enrolled in Canvas and receiving my e-mails.

Program Learning Outcomes (PLOs)

Upon successful completion of the requirements for the MA in Research and Experimental Psychology, students will be able to:

Goal 1. Knowledge Base – Students completing the MA in Psychology program will understand the major theoretical perspectives and research methods across areas of experimental psychology, i.e., Developmental, Social, Cognitive, and Physiological.
  • PLO 1.1 – Understand the major theoretical perspectives and research methods across areas of experimental psychology, i.e., Developmental, Social, Cognitive, and Physiological.

Goal 2. Research Methods & Scholarship – Graduates of our program will possess an advanced level of competence in research methods, statistical techniques, and technical writing skills. Students completing the MA in Psychology program are required to complete a thesis. The thesis will:
  • PLO 2.1 – demonstrate creative problem-solving in the design, implementation of empirical research.
  • PLO 2.2 – demonstrate project management skills in the implementation of empirical research.
  • PLO 2.3 – demonstrate advanced competency in the statistical analysis and interpretation of empirical research findings.
  • PLO 2.4 – be able to communicate (oral and written) their research findings at a professional level.

Goal 3. Career Enhancement – Graduates of our program will experience career enhancement through placement in a doctoral program or acceptance of a position requiring a master's in psychology in the public or private sector. Students completing the MA in Psychology program will:
  • PLO 3.1 – achieve career enhancement through placement in a doctoral program or acceptance of a position requiring a master's in psychology in the public or private sector

STAT 235 contributes to PLOs 2.1, 2.3, and 2.4.

Course Learning Outcomes

The goals of this course are to help you: build a solid conceptual understanding of statistics in research, develop the practical skills to use statistics in your own research, and become a self-directed learner.

Upon successful completion of this course, you will be able to:
  • CLO 1 – Define statistical procedures, including those associated with: multiple regression, logistic regression, general linear model, analysis of covariance, multivariate analysis of covariance, principle components and factor analysis, and structural equations modeling.
• CLO 2 – Describe which statistical procedures are appropriate for a given research situation
• CLO 3 – Discuss the underlying requirements and assumptions of statistical procedures
• CLO 4 – Conduct and interpret statistical analysis using computer software (SPSS)
• CLO 5 – Communicate results of statistical analysis in APA style for scientific publication.

The learning objectives will be assessed via written assignments and exam questions.

The course learning objectives were adapted from those of Dr. Sean Laraway, Dr. Howard Tokunaga, and if applicable, for General Education (GE), American Institutions (AI), and Graduation Writing Assessment Requirement (GWAR) courses. Information may be found in Guidelines for GE, AI, GWAR (http://www.sjsu.edu/senate/docs/2014geguidelines.pdf) per University Policy S14-5, at http://www.sjsu.edu/senate/docs/S14-5.pdf) effective Fall 2014.

Required Texts/Readings (Required)

Textbooks

   (6th edition should be fine, but make sure to compare pages with fellow students with 7th ed.)

   Purchase Option 1:

   Purchase Option 2:
   SJSU Bookstore https://sjsu.bncollege.com/shop/sjsu/page/find-textbooks
   Enter: Section 01
   You can buy or rent new or use, loose-leaf or digital. Prices range from $59.99 (rent digital) to $158 (buy new loose)


Additional Readings will be made available on the Canvas site.

Other technology requirements / equipment / material

• SPSS and Microsoft Excel
   Many assignments will require you to perform analysis in and outside of class using SPSS and Microsoft Excel. To use SPSS, it is intended that you obtain a copy of SPSS for your own computer using the SJSU site license at no cost. Instructions to download, install, and license SPSS are available on the software downloads web site at https://www.sjsu.edu/it/services/collaboration/software/instructions.php SJSU’s license for
Microsoft Office allows you a free subscription to Office 365, which includes a download of Excel. Visit the eligibility web site at http://www.office.com/getoffice365

Course Requirements and Assignments

Homeworks (15% of grade - 150 pts)
Throughout this semester, there will be two main types of homework assignments. Both types of assignments will be submitted via Canvas as Word or PDF files.

1. Statistical Analyses (10%) due @ 11:59pm

   The first type, designed to help teach you to conduct and interpret the results of statistical analyses, asks you to open SPSS data files, run analyses, and bring the output of these analyses to class to facilitate discussion. There will be 10 of these assignments, each worth a maximum of 10 points. NOTE: Depending on the assignment, late homework (turned in no later than one class past its original due date) may be accepted with a deduction of 5 points/day.

2. Evaluation/Questions/Comments of Complete Examples in T&F (5%) due @ 11:59pm

   The second type of assignment consists of reading the statistics and results sections Complete Example in T&F for that chapter and providing questions or comments you have about it. You are encouraged to include your own evaluation of the strengths and weakness of the statistics used in the particular paper testing its hypotheses. There will be 5 of these assignments, each worth a maximum of 10 points, but if you do a 6th one it will count as extra-credit (10 points). Because of the nature of these assignments, late homework will not be accepted.

Class participation (5% of grade - 50 pts)

Ongoing, active student participation during class sessions is an absolutely essential component of this class, which means you need to make every effort to attend all class sessions. There may be many times in which you feel confused, bemused, frustrated, or perturbed. I need and expect you to express your questions, thoughts, and feelings during class. There is no such thing as a stupid question – really! Class participation will be a determining factor for students whose course grade is 'borderline' (ie, slightly below the cutoff for the next highest grade).

Exams (30% of grade - 300 pts)

There will be two exams. The first exam will be worth 120 points and the second worth 180. The exams will address the ability to interpret computer output as well as discuss relevant conceptual and statistical issues. There will be no make-up exams without prior notification and agreement.

Paper (25% of grade - 250 pts)

There will be one paper. The purpose of this paper (approximately 10 pages in length) is to give you practice in writing literature reviews, conducting analyses on a set of data, interpreting the results of these analyses, and writing up the findings in standard APA format. The journal articles we will read will help show you how to (and how not to) present and discuss your analyses. Late papers may be accepted with substantial penalty.

Final examination (25% of grade - 250 pts) – Tue, May 19th, 7:15 – 9:30 A.M.

The final examination is cumulative and will emphasize conceptual and pragmatic issues addressed throughout the semester.
Grading criteria

<table>
<thead>
<tr>
<th>Grade</th>
<th># points</th>
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<tbody>
<tr>
<td>A+</td>
<td>950 &lt;</td>
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<tr>
<td>A</td>
<td>920 - 949</td>
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<tr>
<td>A-</td>
<td>900 - 919</td>
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<tr>
<td>B+</td>
<td>870 - 899</td>
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<tr>
<td>B</td>
<td>820 - 869</td>
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<tr>
<td>B-</td>
<td>800 - 819</td>
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<tr>
<td>C+</td>
<td>770 - 799</td>
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<tr>
<td>C</td>
<td>720 - 769</td>
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<tr>
<td>C-</td>
<td>700 - 719</td>
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<tr>
<td>D+</td>
<td>670 - 699</td>
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<tr>
<td>D</td>
<td>620 - 669</td>
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<tr>
<td>D-</td>
<td>600 - 619</td>
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<tr>
<td>F</td>
<td>&lt; 600</td>
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Rounding is Included in the Grading Scale

The point totals reflect rounding up to the nearest percentage. For example, an A- would normally require 90%. With rounding, it only requires 89.5%. Because rounding is built in to the grading scale, your grade will be based on your final point total, rounded to the nearest whole percentage point (so 89.5% is an A-, but 89.4% is a B+). **To be fair to everyone in the class, these are firm cutoffs, so please don’t ask for additional bumping up.**

Classroom Protocol

In the graduate seminar format, professional behavior is an expectation. This includes the usual: come prepared to class, arrive on time, silence your electronics, be polite and respectful to everyone in the room, do not do off-topic activities during class, and speak up when you are confused, have questions, or need help.

As this is a graduate class, attending class implies your willingness to behave in a professional manner. Respectful disagreement and debate are encouraged. However, unprofessional, disrespectful, or disruptive behavior is a violation of the Student Code of Conduct, available at http://www.sjsu.edu/studentconduct/docs/Student%20Conduct%20Code%202013.pdf. Such behavior may result in being asked to leave the class and/or referrals to the Office of Student Conduct and Ethical Development.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs’ Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

You must obtain the instructor’s permission to make any audio or video recordings in this class. Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

About Diversity

Consistent with the mission of San José State University, I welcome persons of differing backgrounds and experiences including, but not limited to, age, disability and health status, ethnicity and race, family.
## Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Source</th>
<th>Chapter/Topic/Reading</th>
<th>Homework</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 23</td>
<td>T&amp;F</td>
<td>Ch 1: Introduction to Multivariate Statistics</td>
<td></td>
</tr>
</tbody>
</table>
| 2    | Jan 28   | T&F    | Ch 2: Overview of Statistics  
Sections 2.1.1 and 2.1.2 |          |
| 2    | Jan 30   | T&F    | Ch 2: Overview of Statistics  
Sections 2.1.3, 2.1.4, and 2.2 to 2.5  
For Section 2.1.3  
read only Logistic Regression  
omit Section 2.1.5 (Time Course of Events)  
*Pallant*  
*Ch 10: Choosing the right statistic*  
*Ch 11: Correlation; Ch 12: Partial Correlation* |          |
| 3    | Feb 4    | T&F    | Ch 3: Review of Univariate/Bivariate Statistics | HW1 SPSS: Correlation and Partial Correlation (regress.sav T&F) |
| 3    | Feb 6    | T&F *Pallant* | Ch 3: Review of Univariate/Bivariate Statistics  
*Ch 20: Mixed ANOVA* |          |
| 4    | Feb 11   | T&F    | Ch 4: Data Cleaning | HW2 SPSS: Repeated Measures ANOVA (experim.sav; Pallant) |
| 4    | Feb 13   | T&F    | Ch 4: Data Cleaning & Review | HW3: Screen.sav SPSS  
Due Feb 14, 11:59pm |
| 5    | Feb 18   |        | Exam 1 (only Ch 1 -4), GLM on next exam |          |
| 5    | Feb 20   |        | Ch 18 GLM |          |
| 6    | Feb 25   | T&F *Pallant* | Ch 5: Multiple Regression: 5.1 to 5.3 (pp 99-109)  
*Ch 13 Multiple Regression* |          |
| 6    | Feb 27   | T&F    | Ch 5: Multiple Regression  
Sections 5.4 and 5.5 (pp 109-121)  
Omit 5.4.2 (Matrix Algebra) | HW4 SPSS: Multiple Regression |
| 7    | Mar 3    | T&F    | Ch 5: Multiple Regression: 5.6 (pp 121-137) | Questions Sequential Regression Ex.5.7.3  
Due March 2 11:59pm |
| 7    | Mar 5    | T&F    | Ch 5: Multiple Regression: 5.7 and 5.8 Examples and SPSS  
(pp. 138-163) (omit 5.8.2 & 5.8.3) | HW5: Sequential Regression |
| 8    | Mar 10   | T&F *Pallant* | Ch 8: Logistic Regression  
*Ch 14: Logistic Regression* | Questions Logistic Regression Ex 10.7.2  
Due 3/911:59pm |
| 8    | Mar 12   | T&F    | CH 8: Logistic Regression |          |
| 9    | Mar 17   | T&F *Pallant* | Ch 6: Analysis of Covariance (ANCOVA)  
*Ch 22: Analysis of Covariance* | HW6 SPSS: Logistic Regression |
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<th>Week</th>
<th>Date</th>
<th>Source</th>
<th>Chapter/Topic/Reading</th>
<th>Homework</th>
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<tr>
<td>9</td>
<td>Mar 19</td>
<td>T&amp;F</td>
<td>Ch 6: Analysis of Covariance (ANCOVA)</td>
<td>Questions ANCOVA</td>
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<td>Ex 6.6.2, due 3/18 11:59pm</td>
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<td>10</td>
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<td>T&amp;F</td>
<td>Ch 7: Multivariate Analysis of Covariance (MANCOVA)</td>
<td>HW7 SPSS: ANCOVA</td>
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<td>Ch 21: Multivariate Analysis of Variance</td>
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<td>10</td>
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<td>T&amp;F</td>
<td>Ch 7: Multivariate Analysis of Covariance (MANCOVA)</td>
<td>Questions MANCOVA</td>
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<td>11</td>
<td>Mar 31–Apr 2</td>
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<td>SPRING BREAK</td>
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<tr>
<td>12</td>
<td>April 7</td>
<td>T&amp;F</td>
<td>Ch 7: Multivariate Analysis of Covariance (MANCOVA)</td>
<td>HW8 SPSS: MANCOVA</td>
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<td>12</td>
<td>Apr 9</td>
<td>T&amp;F</td>
<td>Exam 2</td>
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<td>13</td>
<td>Apr 14</td>
<td>T&amp;F</td>
<td>Ch 13: Principal Components Analysis (PCA) and Factor Analysis (FA)</td>
<td>Questions PCA/FA</td>
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<td>Ch 15: Factor Analysis</td>
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<tr>
<td>13</td>
<td>Apr 16</td>
<td>T&amp;F</td>
<td>Ch 13: Principal Components Analysis (PCA) and Factor Analysis (FA)</td>
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<tr>
<td>14</td>
<td>Apr 21</td>
<td>T&amp;F</td>
<td>Ch 13: Principal Components Analysis (PCA) and Factor Analysis (FA)</td>
<td>HW9: SPSS: PCA</td>
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<td>14</td>
<td>Apr 23</td>
<td>T&amp;F</td>
<td>Ch 14: Structural Equations Modeling (SEM)</td>
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<tr>
<td>15</td>
<td>Apr 28</td>
<td>T&amp;F</td>
<td>Ch 14: Structural Equations Modeling (SEM)</td>
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<tr>
<td>15</td>
<td>Apr 30</td>
<td>WPA:</td>
<td>No Class</td>
<td>Questions SEM</td>
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<td>10 page paper is due (midnight)</td>
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<td>Ex 14.6.2</td>
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<td>Due May 4, 11:59pm</td>
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<tr>
<td>15</td>
<td>May 5</td>
<td>T&amp;F</td>
<td>Ch 14: Structural Equations Modeling (SEM)</td>
<td>HW10: SPSS/Amos: SEM</td>
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<tr>
<td>16</td>
<td>May 7</td>
<td>T&amp;F</td>
<td>Ch 14: Structural Equations Modeling (SEM)</td>
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<tr>
<td>Final</td>
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<tr>
<td>Exam</td>
<td>Tue May 19</td>
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