

MT 32000 – Advanced Statistics
ES 60200 – Quantitative Methods for Environmental Science
Professor L. Cornick

Meeting times: TTH 10:30 – 12:50, GH 308 (GIS Lab)
Office Hours: GH 303B, W 10:00 – 12:00, or by appt.
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Lab Grader: Jenny Godfrey ggodfrey@alaskapacific.edu

Syllabus: This syllabus is your resource for knowing what is expected of you in this class – read it thoroughly and refer to it often. It is also our contract, and you are responsible for meeting all deadlines and for completing the required reading and homework assignments *prior* to class.

Course Description: Practical application of both univariate and multivariate advanced statistical methods including multiple and logistic regression, multivariate and repeated measures ANOVA, and principal components and cluster analysis.

Prerequisite: MT22000 or equivalent.

Learning Objectives:

1. Gain in-depth understanding of the use of statistics in the natural and environmental sciences, including statistical design, hypothesis testing, data acquisition, entry and analysis
2. Gain a basic understanding of more advanced statistical techniques and experimental design
3. Gain additional skills and understanding of SPSS statistical software, including input, analysis, interpretation of output, and graphical display of data and results.

These objectives will be met through interactive lectures, online quizzes, self-directed computer labs and discussion.

Required Materials:

Text: Mertler and Vannatta. 2005. Advanced and Multivariate Statistical Methods, 3rd ed.

Course Website (Moodle): The course website will contain lecture notes, lab assignments and keys, weekly quizzes, exam keys, deadlines and assignment scores. Access the website via <http://distance.alaskapacific.edu/>. Click on “Environmental Science” and then the course number. Weekly Self Directed Labs will be uploaded and graded on Moodle. You will also be expected to monitor the website regularly for adjustments to the schedule, assignments, etc.

Grading: Grades will be assigned on a straight scale, based on the following distribution of assignments:

Online Quizzes (10 @ 10 pts each)	100 points
Self-Directed Labs (9 @ 50 pts each)	450 points
Individual Written Assignments (5 @ 10 pts each)	50 points

Total Points Possible 600

Borderline grades will be decided on attendance, contributions to class discussions and exercises (including online discussions), and adherence to class policies.

Class Policies and Standards

Grading: My goal is for all students to earn A's. But to reach this goal you need to take ownership of your own learning. You need to come to class, participate fully and follow my suggestions of reading before class and keeping up with your assignments. I can't force you to learn, we need to cooperate to facilitate learning. My role is to provide an environment conducive to learning. Your responsibility is to be prepared, receptive and engage yourself with the course and the material. If you have difficulties with any aspect of the course, it is important to ask for help early and often. That's why I'm here!

An above average grade requires above average performance!

A: Excellent work. Has exceeded requirements. Writing and factual errors in assignments are minor, if any. Content indicates a thorough and synthetic comprehension of the material. Student always participates in class with enthusiasm and interest.

B: Good work. Has met requirements and exceeded some. Some errors in writing or factual content occur, these do not interfere with understanding. Content indicates good understanding of the material. Student usually participates in class with enthusiasm and interest.

C: Average work. Meets minimal requirements. Writing is poor and errors may interfere with understanding the writer's intent; factual errors occur but are not ubiquitous. Content is shallow, or fails to indicate a good understanding of the assignment. Student is present in class, but participation is minimal, without interest or with reluctance.

D: Poor work. Fails to meet some of the minimal requirements. The quality of writing interferes with understanding the writer's intent and factual errors are frequent. Content contains substantial gaps, is shallow, and fails to indicate more than a minimal understanding of the material. Student is sometimes absent and fails to participate in a meaningful way in class.

F: Failing work. Does not meet requirements, little or no understanding of basic concepts, writing is very poor. Content demonstrates a near complete lack of understanding of the material. Student is chronically late or regularly absent from class, misses assignments or is chronically late turning in work, and when present is disruptive.

Grading, Attendance & Tardiness: Attendance has direct relevance to grading and is required by the Federal Government in order to maintain financial aid status. Students who have more than two unexcused absences or who are chronically late for class may be dropped from the class or have their grade reduced by a full letter grade at the discretion of the professor. **An excused absence requires a written or email note from your advisor or physician, or prior acknowledgement by the professor. ATTEND EVERY CLASS. ALWAYS ARRIVE ON TIME.**

Late work: Assignment deadlines are **firm** – no makeups will be given unless you have made **prior** arrangements with me. Late work will **very, very rarely** be accepted, **always** at my discretion, and will **always** result in a 10% per day penalty. Late work interferes with your learning, my grading and teaching schedule, and my ability to give feedback; it impacts every student in the class. If you must miss class, make arrangements to turn in the work that is due for that class **before** it is due, or have a classmate turn it in for you. If you are unexpectedly absent (illness, personal emergency or trauma, car accident) late work will be accepted within an agreed upon time after your return to class. See me outside of class your **first day back** to arrange due dates after unanticipated absences. Please do not ask to turn in late work for reasons of sports obligations, travel, partying, sloppy computer back-up habits (always keep multiple copies on separate disks) or inefficient scheduling of your study time. If you arrange for another student to turn in your work, **YOU** are still responsible for ensuring that it is turned in as agreed.

Remember...poor planning on your part does not constitute an emergency on my part!

Conduct: Respect, responsibility and consideration for others are the primary guiding principals in my classroom. Illegal actions and alcohol consumption are not allowed during class or on field trips. Smoking is not allowed in class; if you must smoke on field trips, please be courteous and do so out of sight and smell of non-smoking classmates, and **definitely** of the professor! Please refrain from coming and going during class. If you have to leave before class is finished, please do so quietly. Please leave children, pets, cell phones, pagers, MP3's and other electronic devices at home, or be sure that they are turned off prior to coming to class. **If your cell phone or other electronic device goes off during class you will be required to bring a yummy treat for the whole class at the next class meeting or have your participation grade reduced by 10%!!**

Class work load: A full college load of twelve or more credits is more than a full time job, especially as APU packs a full semester course into just eleven weeks (Session) or four weeks, full time (Block). Expect a substantial work load.

Editing & Assignment Formatting: All assignments (unless otherwise noted in the syllabus) should be turned in on time, typed, in **Arial 11-point** font on 8 ½ x 11-inch paper with one inch margins. Use **1½ line spacing**, which allows room for comments, but saves paper. For assignments longer than one page, staple all sheets together. **I will not accept unstapled work!** Cover pages, plastic folders, and other “jackets” should not be used. Both quality of writing and of content count towards your grade (see criteria, above). **Proof-read all work before you turn it in!** Please see me if you have questions about formatting or grammar. I will correct the first page of any written assignment for grammar and formatting errors – it will be your responsibility to find subsequent errors and correct them in the remainder of the assignment. Visit the writing center on campus if you need help with writing skills or ESL help.

When citing another author's work, cite parenthetically in the text. Include the complete citation in the Literature Cited section. See the handout **Sample References** for formatting examples.

Academic Honesty - See the APU Honor Policy in the current Catalog. Remember that you are bound by this. All work that you turn in must be your own; proper credit must be given to sources of ideas or materials that you draw upon in any assignment. ***Plagiarism on any scale, including direct use of published or unpublished internet content, will be grounds for immediate failure in the course.***

Students requiring reasonable accommodation to fully participate in this course should notify me within the first week of class. They must also notify Tamara Randolph, Disabilities Services Coordinator, at 564-8345.

Schedule

Each week we will cover a specific topic or statistical test. You will need to have read any assigned materials for that week **PRIOR** to class on Tuesday. Thus, the lectures should be the *second* time you have seen the material, and you should be prepared to answer and ask questions during class. On Tuesdays I will give a brief lecture to introduce you to the topic, define terms and go over the SPSS procedures for that week's lab. Don't place implicit faith in my words. I can make mistakes, so don't hesitate to stop me and ask questions. On Thursdays I will hand out instructions and data for the Self-Directed Lab and go over SPSS commands again. **Please plan to do the majority of the lab in class on Thursday so that you can get help if needed! Labs are due on Moodle no later than 10:00 am on the Monday following lab – NO EXCEPTIONS!! During Tuesday demonstrations your monitors are to remain turned OFF except during SPSS demonstrations – your focus should be on the front screen and following the lecture notes. NO OTHER PROGRAMS ARE TO BE OPEN AT ANY TIME DURING ANY CLASS!**

Week	Dates	Topic (Subject to change)	Read BEFORE (Mertler & Vannatta)
1	2/5	Class Business, Pre-test, Review of the Normal Distribution	
2	2/10	Lecture 1 – Multivariate Statistics and Techniques	Ch. 1-2
	2/12	Self Directed Lab (SDL) 1 – ANOVA and Linear Regression Review	
3	2/17	Lecture 2 – Pre-Analysis Data Screening	Ch. 3
	2/19	SDL 2 – Data Screening Exercises, p. 65	
4	2/24	Lecture 3 – Factorial ANOVA	Ch. 4
	2/26	SDL 3 – Factorial ANOVA	
		Discipline Paper Evaluation 1 Due	
5	3/3	Lecture 4 – Analysis of Covariance (ANCOVA)	Ch. 5
	3/5	SDL 4 – ANCOVA	
6	3/9 – 3/13	SPRING BREAK!!	
7	3/17	Lecture 5 – MANOVA and MANCOVA	Ch. 6
	3/19	SDL 5 – MANOVA	
		Discipline Paper Evaluation 2 Due	
8	3/24	Lecture 6 – Multiple Regression	Ch. 7
	3/26	SDL 6 – Multiple Regression	
9	3/31	Lecture 7 – Factor Analysis	Ch. 9
	4/2	SDL 7 – Factor Analysis	
10	4/7	Lecture 8 – Discriminant Analysis	Ch. 10
	4/9	SDL 8 – Discriminant Analysis	
		Last day to withdraw with “W” grade	
11	4/14	No class – Senior Project Presentations (attend 2 for credit)	
	4/16	Lecture 9 – Logistic Regression	Ch. 11
		Senior Project Evaluations Due	
12	4/21	SDL 9 – Logistic Regression	
	4/23	Putting it all together – how the heck do I do my thesis/senior project?	
		Using Statistics in Your Senior Project/Thesis Assignment Due	

Assignments

Online Quizzes

Each week I will place a quiz on the course web page on Moodle (no later than the end of the day on Monday). In order to receive credit, you must take the quiz **no later than 10:00 am on that Thursday**. The quizzes are designed to help you understand the material, so you will be allowed three attempts for each quiz. Your score for the quiz will be the mean of the three scores that you receive when taking the quiz, or until you score a 10. Do not make repeated attempts after you score a 10! **There will be no makeup quizzes given – no exceptions!!**

Self-Directed Labs

Each Thursday you will work through a lab exercise based on a hypothetical data set which I will provide in a handout. The handout will contain all the background information you need to frame the problem, the raw data and instructions. Be sure to bring your lecture notes and your text to lab so that you can refer to the SPSS instructions and output interpretation guidelines while working through the lab. Most of the lab should be completed during class, but you may need to work on the lab on your own time as well. I will be there during lab to give you some guidance and answer specific questions, but you will be expected to work through the majority of the lab **on your own** – that's how you will become proficient at using SPSS. This may require you to "play around" a bit in SPSS and try different things until you get a result that is comparable to the lecture notes or my in-class instructions. For each lab you will be required to write a brief report that contains the following elements of a scientific paper: Methods (including reference to hypotheses), Results and Discussion. Refer to the background information provided for context and constructing appropriate hypotheses. Results and Discussion sections should contain appropriate SPSS output, with complete interpretation of the test results and appropriate conclusions. Lab reports are due **no later than 10:00 am the Monday following lab** and will be uploaded to Moodle. If you have difficulty uploading your lab, email it to the TA to ensure that it is turned in on time!! See **Lab Report Guidelines** for additional information and instructions.

Individual Written Assignments

You will have five individual written assignments towards the end of the session. Each of these is to be a **maximum of 1 page**, typed. These assignments will consist of the following:

1. Evaluation of the Statistics in a Discipline Paper (2) – write an evaluation of the statistical methods employed in a paper from *your* discipline. Include a *brief* statement of the hypotheses/research questions to set the stage. If you can find something that uses the tests you're learning in this class all the better. Be prepared to share your review with the class in small group discussions.
2. Senior Project Summaries (2) – write a brief description of the project presentation you attended, and the describe and evaluate the statistics employed in the project. If statistics were *not* used, describe any statistical analyses you might employ to improve the project. Be sure to include a discussion of figures and tables in your evaluation; for example, what types of figures and tables were used? would you have used different formats?
3. Using Statistics in Your Senior Project/Thesis – write a description of the statistical methods you will use in an upcoming research project. If you do not have a Senior Project or thesis developed yet, you may use any class project, or come up with a new project idea. The purpose of this assignment is to get you thinking about statistical analysis in the design of your project, *before* you start collecting data! Your write-up should include a brief introduction to the project and the hypothesis(es) you will be testing. It should also include the methods for data collection and all statistical tests you will employ, including alpha levels, etc.

A word about office hours...

Statistics can be a very challenging topic of study, but one that has "a-ha" moments for those who apply themselves. I am here to help you have those moments, but I can't help you if you don't help yourself. If you find yourself struggling, come to office hours early and often so that I can help you get on the right track. This is a class where one-on-one discussion can be very helpful – so take advantage of it! **DO NOT wait to ask for help 20 minutes before the lab is due – that is too late!** Office hours signup sheets will be posted on my door for Wednesday office hours, and other appointments are available when necessary. I strongly urge you to utilize the Wednesday slots so that you can be sure you understand the concepts BEFORE you attempt the lab!