

General Information							
Course Title:	Multivariate Biostatistics			Course Designation:	HES 522		Credits: 3
Semester:	Spring		Year:	2008			
Department:	Public Health Sciences						
Director:	Vernon M. Chinchilli, PhD		Phone #	4262	Email:	vchinch@psu.edu	Office Rm # A2200
Time :	07:30 to 9:55 AM		Days:	Fridays			Location: H4510J

Course Information

Description and/or Overview:

This is the third course in the sequence of biostatistics courses and it is an elective course for the MS in Health Evaluation Sciences. Students who desire more statistical expertise in biomedical research should consider registering for the course. The course builds on previous statistical knowledge garnered from three other courses, namely, Principles of Biostatistics (HES 520), Applied Biostatistics (HES 521), and Clinical Trials: Design and Analysis (HES 580). The major objectives of the course are to provide students the statistical tools for designing and analyzing studies that involve multivariate response, i.e., (1) multiple responses on any one occasion, (2) the same response repeatedly over time, or (3) a combination of thereof. For continuous outcomes, the course involves multivariate regression, multivariate analysis of variance (MANOVA), multivariate analysis of covariance (MANCOVA), mixed-effects linear models for repeated measurement and crossover designs, principal components analysis, factor analysis, and canonical correlation analysis. For categorical outcomes, this involves generalized estimating equations. SAS for Windows statistical software will be used throughout the course for data analysis. Examples will be provided from real-world clinical trials and observational studies in clinical and biomedical research.

Goals and/or Objectives:

The major objectives of the course are to provide students the statistical tools for designing and analyzing studies that involve multivariate response, i.e., (1) multiple responses on any one occasion, (2) the same response repeatedly over time, or (3) a combination of thereof.

Pre-requisites:

Principles of Biostatistics (HES 520)

Applied Biostatistics (HES 521)

Clinical Trials: Design and Analysis (HES 580)

Requirements; course-specific policies and expectations:

Students should have access to a PC with SAS for Windows software for homework assignments and take-home exams. Students also should have viable e-mail access and read e-mail regularly. ANGEL, the Penn State course management system, will be used to post files with the course materials, such as lectures, articles, homework assignments, exams, etc. Therefore, students should have access to a PC with an internet connection outside of class time. Course grade will be based on homework assignments (1/3), mid-semester take-home exam (1/3), and final take-home exam (1/3). Students are expected to perform their own work on the exams and not consult with classmates. Students are expected to turn in assignments and exams on time, unless there is prior approval from the instructor. Students are expected to attend class regularly. Students should consult with the instructor if they anticipate missing more than one class. Cell phones and pagers should be turned off during class time in order not to disrupt the class.

Required Texts and Resources:

Required text:

Applied Multivariate Statistical Analysis (6th Edition), Richard A. Johnson and Dean W. Wichern

Prentice Hall; 6 edition (March 23, 2007)

ISBN-10: 0131877151

Electronic Links:

ANGEL, the Penn State course management system, will be used to post files with the course materials, such as lectures, articles, homework assignments, exams, etc.

Attendance Policy:

Students are expected to attend class regularly. Students should consult with the instructor if they anticipate missing more than one class. Cell phones and pagers should be turned off during class time in order not to disrupt the class.

Examination Policy:

The mid-semester exam and the final exam will be take-home, open-book exams because of the nature of the statistical problems. Students are expected to perform their own work on the exams and not consult with classmates.

Grading Criteria:

Course grade will be based on homework assignments (1/3), mid-semester take-home exam (1/3), and final take-home exam (1/3). Students are expected to turn in assignments and exams on time, unless there is prior approval from the instructor.

Academic Integrity

Academic Integrity at Penn State is defined by Faculty Senate Policy 49-20 as “the pursuit of scholarly activity in an open, honest and responsible manner”. The University's Code of Conduct states that “all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others”. Academic dishonesty (including, but not limited to cheating, plagiarism, or falsification of information) will not be tolerated and can result in academic or disciplinary sanctions such as a failing (F) grade in the course.

Plagiarism

[For more information, see: <http://tlt.its.psu.edu/suggestions/cyberplag/cyberplagstudent.html>]

Statement on Remediation

The basis for grades, as stated in [Senate Policy 47-20](#), is "...the instructor's judgment of the student's scholastic achievement..." Occasionally, a disagreement arises in the assignment of a grade. A student who wishes to question or challenge the grade assigned in a course must first discuss grading practices and assignments with the instructor. It is expected that the student and instructor will try to eliminate any misunderstandings and will attempt to work out any disagreements over grades.

On the rare occasion that a student and instructor fail to resolve the grade dispute through informal means, the student may request that the head of the academic program offering the course act as a mediator. If this mediation does not resolve the dispute, the student who is a graduate student may request further mediation from the associate dean for graduate studies.

[For more information, see: <http://www.psu.edu/dept/oue/aappm/G-10.html>]

Educator's Code of Conduct

The Penn State Milton S. Hershey Medical Center and Penn State College of Medicine are dedicated to developing and maintaining a strong commitment to ethical teaching practices at all levels of the education process.

The foundation for this Educator's Code of Conduct is provided by the Penn State University Graduate School Statement on Teaching Ethics (1). The development of this Graduate School statement was based on a special issue of the journal, *New Directions for Teaching and Learning*. In this special issue, entitled *Ethical Dimensions of College and University Teaching: Understanding and Honoring the Special Relationship between Teachers and Students* (2), several authors provided theoretical and practical guidelines for honing ethical college teaching skills. Some of the authors' recommendations have been used to formulate the Educator's Code of Conduct provided herein. Some of these recommendations were modified to specifically fit the needs of both educators and students at the Hershey Medical Center and the Penn State College of Medicine. Both the Unified Campus Commitment to Excellence of the Hershey Medical Center and Penn State College of Medicine (3) and the Code of Ethical Behavior of the Hershey Medical Center, Policy A-20 HAM (4) were also consulted in preparing this Educator's Code of Conduct.

Four Norms to Govern Teaching

Honesty

Honesty and integrity must be practiced during all aspects of the education process.

Promise-Keeping

Promise keeping requires the educator to fulfill the "promises" made at the beginning of the semester or any other learning activity. Syllabi, assignments, grading principles, and class and office hour schedules each involve promises that are made to students and that must be adhered to under normal circumstances.

Respect for Persons

The educator must approach the learner with personal respect. In addition, the educator ought to encourage mutual respect among students. In particular, respect for race, religion, sexual orientation, disability gender, age, marital status, cultural differences, and political conviction should be supported and encouraged in all aspects of the educational process. Additionally, educators ought to show respect and common courtesy for students both during interpersonal interactions and in responding promptly to students' need for guidance and feedback. An environment free from harassment and discrimination, verbal abuse, physical violence, and intimidation in any form must also be provided for all learning activities.

Fairness

Recognizing the inherent subjectivity involved in grading, an educator ought to ensure that their grading practices are as objective as possible by creating and adhering to unambiguous criteria.

Principles of Ethical College and University Teaching

Content Competence

An educator maintains a high level of subject matter knowledge and ensures that the content of the educational experience is current, accurate, representative, and appropriate to the position of the learning experience within the students' program of study. The educator must be capable of approaching each learner with a commitment to meeting his or her educational needs.

Pedagogical Competence

A pedagogically competent educator communicates the objectives of the educational experience to students, is aware of alternative instructional methods or strategies, and selects methods of instruction that are effective in helping students to achieve the course objectives.

Dealing with Sensitive Topics

Topics that students are likely to find sensitive or discomforting are dealt with in an open, honest, and positive way.

Student Development

The overriding responsibility of the educator is to contribute to the intellectual development of the student, at least in the context of the educator's own area of expertise, and to avoid actions such as exploitation and discrimination that detract from student development.

Dual Relationship with Students

To avoid conflict of interest, an educator does not enter into dual-role relationships with students that are likely to detract from student development or lead to actual or perceived favoritism on the part of the educator. The establishment of a romantic/sexual relationship between an educator and a student should be reported to the immediate supervisor of the educator. Such relationships should be dealt with consistent with Penn State Administrative Policy AD41 — Sexual Harassment (5).

Student Confidentiality

Student grades, letters of evaluation, attendance records, and private communications are treated as confidential materials and are released only with student consent, for legitimate academic purposes, or if there are reasonable grounds for believing that releasing such information will be beneficial to the student or will prevent harm to the student or to others.

Patient Privacy and Confidentiality

Educators who utilize patient information as part of any educational experience must follow patient privacy and confidentiality guidelines as outlined by the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

Respect for Colleagues

An educator respects the dignity of his or her colleagues and works cooperatively with colleagues in the interest of fostering student development.

Valid Assessment of Students

An educator is responsible for taking adequate steps to ensure that the assessment of a student's performance is valid, open, fair, and congruent with the course/educational experience objectives. An educator must be aware that such assessments are important in students' lives and in the development of their careers.

Respect for Institution and Profession

In the interest of student development, an educator is aware of and respects the educational goals, policies, and standards of the institution in which he or she teaches and the profession which he or she represents.

Citing Sources of Educational Material

An educator acknowledges and documents, as appropriate, the sources of information and other materials used for teaching.

Violations of the Educator's Code of Conduct

Should a learner experience conduct that is inconsistent with the Educator's Code of Conduct, he/she is encouraged to first address the issue with either the educator responsible for the inconsistency or the director of the course in which the educator teaches. Should this attempt to resolve the problem fail, or if the nature of the inconsistency is such that the learner does not feel comfortable addressing the issue with either the educator or the course director, the student may consult other individuals. These individuals may include but are not limited to: faculty advisor, student ombudsman, departmental chair, the Vice Dean for Educational Affairs, and the Vice Dean for Faculty and Administrative Affairs. The decision of who to contact may be dependent on the educational program of the learner and/or type of violation that was encountered.

References:

- (1) <http://www.gradsch.psu.edu/research/ethics.html#teaching>)
- (2) <http://cte.uncwil.edu/et/br030697.htm>
- (3) Unified Campus Commitment to Excellence of the Penn State Milton S. Hershey Medical Center and College of Medicine; 05/11/01
- (4) Code of Ethical Behavior of the Hershey Medical Center, Policy A-20 HAM; Effective Date October, 2001
- (5) <http://guru.psu.edu/POLICIES/Ad41.html>

Developed by the Unified Campus Academic Team Endorsed by Teams Council — May 21, 2003

Course Title:		Multivariate Biostatistics	Course Designation:	HES 522	
Course Director:		Vernon M. Chinchilli, PhD			
Time :	7:30 AM to 10:00 AM	Days:	Fridays	Location	H4510J
Date	Lecture #	Instructor Last, first	Instruction Type (Lecture or lab)	Projected Lecture Topic - This list is an approximate guide to lecture topics. Titles and content are subject to change	
01/18/08	1	Chinchilli, VM	lecture	Introduction, Matrix Algebra	
01/25/08	2	Chinchilli, VM	lecture	Matrix Algebra	
02/01/08	3	Chinchilli, VM	lecture	Matrix Algebra	
02/08/08	4	Chinchilli, VM	lecture	Random Vectors, Sample Geometry	
02/15/08	5	Chinchilli, VM	lecture	Random Sampling, Multivariate Normal Distribution	
02/22/08	6	Chinchilli, VM	lecture	Inferences About Mean Vectors, Hotelling's T^2	
02/29/08	7	Chinchilli, VM	lecture	Inferences About Mean Vectors, MANOVA	
03/07/08	NO CLASS - Graduate Student Forum				
03/14/08	8	Chinchilli, VM	lecture	Multivariate Linear Regression Models	
03/21/08	9	Chinchilli, VM	lecture	MANCOVA	
03/28/08	10	Chinchilli, VM	lecture	Mixed-Effects Linear Models, Repeated Measurements	
04/04/08	11	Chinchilli, VM	lecture	Mixed-Effects Linear Models, Repeated Measurements	
04/11/08	12	Chinchilli, VM	lecture	Mixed-Effects Linear Models, Repeated Measurements	
04/18/08	13	Chinchilli, VM	lecture	Generalized Estimating Equations	
04/25/08	14	Chinchilli, VM	lecture	Generalized Estimating Equations	
05/02/08	15	Chinchilli, VM	lecture	Principal Components, Factor Analysis	
05/09/08	15	Chinchilli, VM	lecture	Canonical Correlation Analysis	

GRADES DUE MAY 12

