University of Montana

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PUBH 520.01: Fundamentals of Biostatistics

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Recommended Citation

Notes: *(1) This syllabus is subject to change by the instructor. Any changes will be announced on Blackboard.*
(2) All times referred to in this syllabus are in Mountain Standard Time.

INSTRUCTOR

Mailing Address:

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Dedicated Hours:

> Dr. Golbeck's dedicated hours will be Tuesdays and Thursdays 10:00-12:00 a.m. Dr. Golbeck will be available via e-mail during dedicated hours for all students. Dr. Golbeck will post exceptions as a class announcement on Blackboard.

Teaching Assistant:

> Kerry Ryan is the Teaching Assistant for this class. Ms. Ryan will be assisting will all organizational aspects of the class. Ms. Ryan can be reached at kerry.ryan@grizmail.umt.edu or 406-243-2571.

COURSE

Description:

> This course is designed for graduate students and practitioners in public health and related fields. The course introduces basic vocabulary, concepts, and methods of biostatistics. The goal is to provide an introduction to how biostatistics works. Topics will include descriptive statistics, probability, random variables, probability distributions, statistical inference, chi-square analysis, linear regression, and correlation.

Prerequisite:
> None

COMPETENCIES

Course:
> At the end of the course you should be able to:

1. Comprehend fundamental biostatistical concepts, and be prepared to use that understanding in the design, execution, communication, or interpretation, of public health or related research.

2. Gain facility with the language of symbols used in the expression of biostatistical analysis tools in order to more fully understand the logic of various approaches and therefore facilitate their correct application.

3. Apply basic descriptive and inferential statistical techniques, taking into account measurement scales, study design, and methodological assumptions and requirements.

4. Understand and appreciate the role of biostatistics and biostatisticians in public health and related sciences.

Public Health:

This course provides students with knowledge, skills, and abilities in the following public health competency areas:

1. Describe the roles biostatistics serves in the discipline of public health.

2. Describe basic concepts of probability, random variation and commonly used statistical probability distributions.

3. Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.

4. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.

5. Apply descriptive techniques commonly used to summarize public health data.

6. Apply common statistical methods for inference.

7. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.

8. Interpret results of statistical analyses found in public health studies.

9. Develop written presentations based on statistical analyses for both public health professionals and educated lay audiences.

FORMAT

Protocol:

Online using Blackboard.

Components:

The course will consist of self-study, discussion, and a project.

1. A self-study format will be used with readings, interactive activities, SPSS activities, and problem sets. Requirements are described below under SELF-STUDY.

2. The conceptual understandings and applied skills developed through this self-study will form the basis for additional development during the weekly Question Discussion Forum and the Student Discussion Forum on the Blackboard discussion board. The Question Discussion Forum and Student Discussion Forum are described below under <u>DISCUSSION.</u>

3. A project will be the capstone to the learning in this course. This will be in lieu of a final exam. Requirements are described below under <u>PROJECT.</u>

Clock:

For the on-line clock, the week starts on Sunday, 12:01 a.m. and ends on Saturday at midnight.

Blackboard Help:

UMOnline has made available an interactive tutorial for using Blackboard as a student. The tutorial and other resources can be found at the following web site: http://umonline.umt.edu/StudentInfo/

NEEDED TOOLS

Books:

1. Selvin, S. 2004. Biostatistics: How It Works. Prentice Hall. ISBN-13: 978-0130466167.
2. (optional) Moore, D.S. and Notz, W.I. 2005. Statistics: Concepts and Controversies, 6 Edition. W.H. Freeman. ISBN-13: 978-0716786368
3. Additional readings will be posted on Blackboard.

Computer:

Access to a Windows-based computer.

Software:

Internet browser
Microsoft Word
SPSS

Option 1: You can purchase the SPSS 16.0 Graduate Pack from the UM Bookstore for approximately $200. This includes the needed add-on modules (Advanced and Regression). This is a four year license.
Option 2: You can lease the SPSS 16.0 Graduate Pack for six months or for 12 months. This software is available as a download or a disk from e-academy (http://www.e-academy.com)
Option 3: This software is available for use in some computer labs on campus.

Calculator:

Scientific calculator capable of data summation and calculating both common and natural logs (bases 10 and e).

SELF-STUDY

Categories of Work:

Work for each Week will be organized into the following six categories: Aims/objectives review, readings, interactive activities, problem sets, SPSS activities, and Aims/Objectives mastery.

1. *Aims and objectives review* helps you to organize your learning. Review the aims and objectives at the start of your work to familiarize yourself with what you should know about and what you should be able to do.

   DEADLINE: The aims and objectives review is to be completed by the end of the day on Monday.

2. *Readings* for weeks 2-12 will be from the (required) Selvin and (optional) Moore/Notz textbooks. Any other readings will be posted on Blackboard. Use the Student Discussion Forum to pose questions to, or weigh into the discussions of questions posed by, your class colleagues.

   DEADLINE: The readings are to be completed by noon on Tuesday.

3. *Interactive Activities* are a custom package of multiple choice questions. Any feedback about these interactive activities should be sent by e-mail to the instructor.

   POINTS: You will receive points based on the proportions of questions you answer correctly on
              your first and second responses.

   DEADLINE: Interactive activities are to be completed by the end of the day on Tuesday.

4. *SPSS activities* use the SPSS statistical software package. These are tutorial in nature and designed to help you understand material and carry out methods learned in this Lesson. Use the Student Discussion Forum to resolve any problems that surface in your computer work.

   POINTS: You will receive points for turning in your completed SPSS activity log.

   DEADLINE: The SPSS activity logs are to be submitted by the end of the day on Wednesday.

   SUBMISSION: The completed SPSS activity log is to be turned in using the Blackboard Assignment
                 feature.

   IDENTIFICATION: On the top of the completed SPSS activity log, include the following:
                    Your name (last, first), Week number.

   FILESAVE: Save your completed SPSS activity log as a Word document with the file name
                YourLastName_SPSSWeekNumber (e.g., Golbeck_SPSSweek1)

   ASSISTANCE: If you need assistance with viewing or submitting your logs, please call the
                 Help Desk at 406-243-4357 or refer to the UMOnline student resources at
                 http://umonline.umt.edu/studentsupport/default.htm.

5. *Problem sets* are at the end of each chapter of the Selvin textbook. The exception is Week 14, when the
   problem sets will be posted on Blackboard. Problem sets are to be done with pencil, paper, and calculator. Use the Student Discussion Forum to get any needed help from your class colleagues.

   POINTS: You will receive points for turning in steps showing how you got from the
              question to the solution. Individual problems will not be graded.

   DEADLINE: Completed problem sets are to be submitted by the end of the day on Saturday.

   SUBMISSION: The set of completed problems is to be sent to the instructor postmarked by the deadline,

or else delivered to the instructor's mailbox in SKB 215 by the deadline.

IDENTIFICATION: On the top of each page, include the following:
Your name (last, first), Week number.

6. *__Aims and objectives mastery__* help you to complete your learning. Review the aims and objectives at the end of your work to make sure you have mastered each of them. Use the Student Discussion Forum to organize a discussion about any objectives that remain unclear.

DEADLINE: The aims and objectives mastery is to be completed by Saturday at midnight.

DISCUSSION

Question Discussion Forum:

Objective: To prepare additional interactive activity questions for possible use by future classes.

Interactive Activity Questions: These are to be based on the week's readings. They are to use the same structure as the interactive activity questions prepared by the instructor, i.e., they should be multiple choice with four options, where each option is followed by an explanation of why that option is right or wrong. The questions should be prepared as a Word document.

Leaders: During the first week of class, the instructor will create a schedule assigning students to lead the Question Discussion Forum in specific weeks. Each assigned student will prepare a draft interactive activity question during each of their assigned weeks.

TIPS: In weeks where there is more than one discussion leader, each discussion leader will draft a question, so that there will be more than one question that will be discussed that week in separate discussion threads.

Be creative when you write the questions! Come up with a question that you think will be helpful to future students. The Interactive Activity questions that you'll be working on each week as part of your self-study will give you ideas, hopefully!

The responses that you write to each possible answer to your question should not give away the answer! The responses should be 'teaching moments' that lead students in the direction of the answer. Remember, students will have a chance to choose another answer each time they've chosen a wrong answer.

DEADLINE: Draft interactive activity questions are to be posted on the Blackboard Question

Discussion Forum by the end of the day on Tuesday. After the discussion has ended on Thursday, the Leaders should revise the question and post a final version that incorporates the feedback by the end of the day on Friday.

Discussants: All students are to participate in the Question Discussion Forum by making suggestions for improving
the draft interactive activity questions. Question Discussion Forum participation constitutes a portion of the grade.

TIPS: In weeks where there is more than one discussion leader, you will be expected to participate in all   discussion threads.

I will be looking for comments that add something new and of substance to the discussion.

Discussion comments may address statistical matters or matters related to question format or style, although comments that address statistical matters will be rated more highly.

DEADLINE: <u>All</u> students are required to participate in the Question Discussion Forum

<u>every</u> week by the end of the day on Thursday. Participation consists of

periodic posting and monitoring throughout the entire period of the Forum.

Project Discussion Forum:

Objective: To discuss statistical issues related to the project.

Leader: The instructor will lead the Project Discussion Forum.

Discussants: All students are to participate in the Project Discussion Forum. Project Discussion Forum participation constitutes a portion of the grade.

DEADLINE: <u>All</u> students are required to participate in the Question Discussion Forum

<u>every</u> week by the end of the day on Thursday. Participation consists of

periodic posting and monitoring throughout the entire period of the Forum.

Student-Led Discussion Forums:

Each week there will be forums (one for the interactive activity, one for the SPSS activity, and one for the problem sets) for student-only discussions using the Blackboard discussion board. The forums will focus on any questions or issues that you have about the readings, problem sets, or SPSS activities. These forums will give you a chance to work directly with your peers. The student-led discussion forums will not be graded.

PROJECT

Database:

For the project, you will identify a database that has 4 variables in it: 2 quantitative variables (e.g., height and weight), and 2 categorical variables (e.g., gender and whether the person completed high school).

Data Management:

In Week 13, you will create this database in, or import it into, SPSS.

Data Analysis:

In Week 15, you will apply all appropriate methods learned in this class using your database.

Biostatistical Communication:

In Week 16, you will write a report that includes your applications written up as textbook-like examples.

DEADLINE: The project is to be completed in Week 16 by Tuesday at midnight.

SUBMISSION: The summary report is to be turned in using the Blackboard Assignment feature.

IDENTIFICATION: On the top of the summary report, include the following:
Your name (last, first), Week number,, "Summary Report".

FILESAVE: Save your summary report as a Word document with the file name
YourLastName_summaryreport (e.g., Golbeck_summaryreport)

ASSISTANCE: If you need assistance with viewing or submitting your assignments, please call the
Help Desk at 406-243-4357 or refer to the UMOnline student resources at http://umonline.umt.edu/studentsupport/default.htm.

See: Project Q&A document posted in Week 13.

ASSESSMENT

This course will use the traditional letter grade option with the use of pluses or minuses.
1. Interactive activities 24% [2% for each of 12]
2. SPSS activities 14% [2% for each of 7]
3. Problem sets 24% [2% for each of 12]
4. Question Discussion Forum participation 26% [4% for Question Forum Discussion leader;
2% for each of 11 weekly postings to discussion board]
5. Project Discussion Forum participation 2% [1% for each of 2 weekly postings to discussion board]
6. Project 10%

COMMUNICATION

Announcements:
Class announcements will be posted in Blackboard by the instructor.
Blackboard system administrators will sometimes post announcements about the Blackboard system.

Discussion forum:
A discussion forum is appropriate for questions or discussions that would normally occur in the classroom. Remember that the discussion forum is public and your classmates can read what you post there.

e-mail:
E-mail should be used for "private'' communication with the instructor or other students. Any questions regarding grades or communication about more personal issues should be handled via email. Important: Please put "BIOSTAT" in the subject line for e-mail communication with the instructor. This helps the instructor in organizing and responding to e-mail communications.

Logging In:

<u>You are expected to log in every MWF to read current announcements that have been posted.</u> You may do this at any time of day.   The Instructor will generally respond to discussions, answer e-mails, etc. within 24 hours.

WARNINGS

Failure to Follow Instructions:

Work submitted by a method other than specified in this syllabus will not receive points.

Late Work:

Late work will not receive points unless there are <u>very</u> serious and verifiable extenuating circumstances. If you wish to request permission to submit a work product late, you must contact Dr. Golbeck well before the assignment deadline.

Plagiarism:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://www.umt.edu/SA/VPSA/index.cfm/page/1321.

Plagiarism is the representing of another's work as one's own. It is a particularly intolerable offense in the academic community and is strictly forbidden. Students who plagiarize may fail the course and may be remanded to Academic Court for possible suspension or expulsion. (See UM Student Conduct Code).

Students must always be very careful to acknowledge any kind of borrowing that is included in their work. This means not only borrowed wording but also ideas. Acknowledgment of whatever is not one's own original work is the proper and honest use of sources. Failure to acknowledge whatever is not one's own original work is plagiarism. (Source: http://www2.umt.edu/catalog/acpolpro.htm)

ACCOMMODATIONS

Students with disabilities will receive reasonable accommodations in this online course. To request course modifications, please contact me as soon as possible. I will work with you and Disability Services in the accommodation process. For more information, visit the Disability Services website at http://www.umt.edu/dss/ or call 406.243.2243 (Voice/Text).

ACADEMIC CALENDAR

August 20-22 (Wednesday-Friday) - Semester Begins; Orientation & Registration
August 25 (Monday) - Classes Begin
September 1 (Monday) - Labor Day, Holiday
October 27 - November 7 - Spring 2009 Registration Begins
November 4 (Tuesday) - Election Day
November 11 (Tuesday) - Veterans Day, Holiday
November 26-27-28 (Wednesday-Friday) - Thanksgiving Vacation
December 6-7 (Saturday-Sunday) Study Days
December 8-12 (Monday-Friday) Final Examinations

COURSE SCHEDULE

Week	Topic	Selvin Readings	Moore /Notz Readings (optional)	Interactive Activities	SPSS Activitiy	Selvin Problem Sets	Question Discussion Forum	Project Discussion Forum	Project
Week 1	Orientation and Introduction		1-7	Orientation and Introduction IA	Install SPSS and Desktop Items				
Week 2 *Labor day*	Descriptive Statistics	1	8-12	Descriptive Statistics IA	Descriptive Statistics SA	1	X		
Week 3	Probability I	2 (pp 36-54)	17	Probability I IA		2: #1-28	X		
Week 4	Probability II	2 (pp 54-80)		Probability II IA		2:#29-54	X		
Week 5	Random Variables	3	20	Random Variables IA		3	X		
Week 6	Probability Distributions I	4 (pp 123-155)	18, 13	Probability Distributions I IA		4:#1-16	X		
Week 7	Probability Distributions II	4 (pp 155-170)		Probability Distributions II IA		4:#17-30	X		
Week 8	Statistical Inference I	5	21, 22	Statistical Inference I IA	Statistical Inference I SA	5	X		
Week 9	Statistical Inference II	6	23	Statistical Inference II IA	Statistical Inference II SA	6	X		
Week 10	Chi-Square Analysis	7	24	Chi-Square Analysis IA	Chi-Square Analysis SA	7	X		
Week 11	Linear Regression I	8 (pp 283-305)	15	Linear Regression I IA	Linear Regression I SA	8:#1-6	X		
Week 12 *Vets. Day*	Linear Regression II	8 (pp. 305-332)		Linear Regression II IA	Linear Regression II SA	8:#7-16	X		
Week 13 *Thanks-giving*	Data Management							X	Identify and construct dataset
Week 14	Correlation	9	14	Correlation IA	Correlation SA	9	X		
Week 15	Data Analysis	1-9						X	Conduct data analysis
Week 16	Statistical Communication								Write summary report