SYLLABUS & COURSE INFORMATION

SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF MINNESOTA

PUBH 6451, SECTION 001

Biostatistics II
Spring 2020

COURSE & CONTACT INFORMATION

Credits: 4 credits
Meeting Day(s): Mondays and Wednesdays
Meeting Time: 10:10am – 12:05pm
Meeting Place: Bruininks Hall 412
All course materials will be on Canvas at http://canvas.umn.edu.

Office hours with Dr. Brearley by appointment.

Contact Type	Contact Information	Role	When to Contact
Instructor	Ann Brearley brea0022@umn.edu	Instructor for this course	Your instructor is your first line of contact. Feel free to email them about • Questions or concerns about the class, material, assignments, deadlines, grades, etc. • Arranging a meeting (in-person or via phone call or video chat).
Co-instructor	Vimal Rao rao00013@umn.edu	Co-instructor for this course	
Teaching Assistants	Karl Brown brow5758@umn.edu Jiuzhou Wang wang9062@umn.edu	Monitor collaborative keys and grade homework assignments and quizzes.	Your TAs are your second line of contact. Feel free to email them about • Questions about concepts.
Technical Support	Technical support options are available on the SPH website. https://z.umn.edu/sphquickhelp	Troubleshoots technical issues related to the course site or course content.	Technical issues with the course site, media, quizzes or assignments.

Please save this contact information to your computer or print it. That way, you can still contact us in the event that you have difficulty connecting to the Internet or accessing the syllabus.

COURSE DESCRIPTION

In this course, we will explore more advanced aspects of statistical analysis methods with a focus on statistical modeling, including: two-way ANOVA, interactions, multiple linear regression, logistic regression, Poisson regression, Kaplan-Meier methods, proportional hazards (Cox) regression, and other regression methods. We will focus on health science applications using output from statistical software packages.

COURSE PREREQUISITES

PubH 6450 with a grade of at least B and health sciences graduate student, or instructor permission.

COURSE GOALS & OBJECTIVES

By the end of the course, students should have a solid understanding of the statistical analysis methods most commonly used in health sciences research. This includes:

- Two-way ANOVA
- Multiple linear regression
- Logistic regression

- Poisson regression
- Survival analysis methods, including Kaplan-Meier analysis and proportional hazards (Cox) regression
- Appropriate SAS and/or R programming language skills needed to implement these methods

METHODS OF INSTRUCTION AND WORK EXPECTATIONS

Course Workload Expectations
PubH 6451: Biostatistics II is a 4-credit course. The University expects that for each credit, you will spend a minimum of three hours per week attending class, reading, studying, and completing assignments, etc. over the course of a 15-week term. Thus, this course requires approximately 180 hours of effort spread over the course of the term in order to earn an average grade.

Methods of Instruction
This course will be taught using the inverted classroom (or "flipped") model. Students are responsible for listening to the recorded lectures online before coming to class. Class time will be devoted to learning activities designed to clarify and reinforce the concepts and to practice applying them both to reading the literature and to carrying out data analysis in SAS or R.
Here is the breakdown of the weekly work expectations:

- **Beginning of the week**: Students will be expected to prepare for the week by viewing several short (10-30 minute) online lectures and reading a literature article which uses the concepts for that week. This work should be completed BEFORE coming to class on Day 1.
- **In-class on Day 1 of the week**: Class time will be devoted to reviewing the lecture material as needed, and then to working collaboratively on the learning activity (Problem Set), focusing on exploring and clarifying the concepts and applying them to understanding a literature article.
- **Between Day 1 and Day 2**: Students will be expected to work through the software lesson for the week to learn how to carry out the relevant analyses using your chosen statistical software (R or SAS). This work should be completed BEFORE coming to class on Day 2.
- **In-class on Day 2 of the week**: Class time will be devoted to reviewing the concepts as needed, and then to working collaboratively on the learning activity (Problem Set), focusing on using software to analyze data and on interpreting the results.
- **After class on Day 2**: Students will be working collaboratively (with guidance from instructors and TAs) to create the answer key for the week's Problem Set. Your learning experience will be thus dependent–to some extent–on your classmates and vice versa. Each student will be expected to contribute at least once to the key each week. Your contribution to the collaborative key will be due **each Saturday by 5:00pm**.
- **At the end of the week**: A written homework assignment and an online quiz covering the material of the week, as well as concepts from earlier weeks, will be **due each Sunday by 11:59pm**. Students are expected to complete the quizzes and homework assignments independently.

Software Lessons & Computing
You will learn how to analyze data via your chosen software (SAS or R) in the software lesson documents. Within each document, there will be *Guided Questions* that ask you to interpret the output from the code in the document. In addition, there will be *Challenge* questions that try to push you in your coding abilities. Both of these are provided to guide your learning and neither will be collected. Feel free to discuss the answers to these in the Question and Answer (Q&A) forums. Additional online resources will also be provided on each topic, if you need further instruction.

The course includes examples of data analysis from SAS and R. You will need access to either SAS or R to complete your assignments.

Projects
There will be two projects within the semester that assess your ability to analyze data via your chosen software, interpret the results, and write a complete analysis report. Students are expected to complete these projects independently, **except** where the instructors specifically note collaboration is acceptable.

Technology
You will use the following technology tools in this course. Please make yourself familiar with them.

- Google Docs for the activity collaborative keys. Training is available via OIT.
- Zoom or Google Hangouts for any group meetings. Information on using Google Hangouts can be found here, and information using Zoom can be found here.

Learning Community
School of Public Health courses ask students to discuss frameworks, theory, policy, and more, often in the context of past and current events and policy debates. Many of our courses also ask students to work in teams or discussion groups. We do not come to our courses with identical backgrounds and experiences and building on what we already know about collaborating, listening, and engaging is critical to successful professional, academic, and scientific engagement with topics.

In this course, students are expected to engage with each other in respectful and thoughtful ways.

In group work, this can mean:

- Setting expectations with your groups about communication and response time during the first week of the semester (or as soon as groups are assigned) and contacting the TA or instructor if scheduling problems cannot be overcome.
- Setting clear deadlines and holding yourself and each other accountable.
- Determining the roles group members need to fulfill to successfully complete the project on time.
- Developing a rapport prior to beginning the project (what prior experience are you bringing to the project, what are your strengths as they apply to the project, what do you like to work on?)

In group discussion, this can mean:

- Respecting the identities and experiences of your classmates.
- Avoid broad statements and generalizations. Group discussions are another form of academic communication and responses to instructor questions in a group discussion are evaluated. Apply the same rigor to crafting discussion posts as you would for a paper.
- Consider your tone and language, especially when communicating in text format, as the lack of other cues can lead to misinterpretation.

Like other work in the course, all student to student communication is covered by the Student Conduct Code (https://z.umn.edu/studentconduct).

COURSE TEXT & READINGS

There is no required textbook for this course.

This course will use journal articles, which are available via the University Libraries' E-Reserves and will be linked from the course site. It is good practice to use a citation manager to keep track of your readings. More information about citation managers is available at https://www.lib.umn.edu/pim/citation.

Optional supplemental readings for each unit (if any) will be listed in the course site. They will be taken from various online resources and published articles.

COURSE OUTLINE/WEEKLY SCHEDULE

This course has specific deadlines. All coursework must be submitted via the course site before the date and time specified on the site. **Note: Contributions to Problem Set/Collaborative Keys are due by 5:00pm Central Time; Homeworks, Quizzes, and Projects are due at 11:59pm Central Time unless indicated otherwise.**

Week	Topic	Lecture & Readings	Activities/Assignments
Week 1 Jan. 21 - 26	• **INTRODUCTION**	**Online Lectures**	• No Software Lesson in Week 1 • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Jan. 25) • Homework (due Sunday Jan. 26) • Quiz (due Sunday Jan. 26)
Week 2 Jan. 27 - Feb. 2	• **TWO-WAY ANOVA**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Feb. 1) • Homework (due Sunday Feb. 2) • Quiz (due Sunday Feb. 2)
Week 3 Feb. 3 - 9	• **MULTIPLE LINEAR REGRESSION, Part 1**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Feb. 8) • Homework (due Sunday Feb. 9) • Quiz (due Sunday Feb. 9)
Week 4 Feb. 10 - 16	• **MULTIPLE LINEAR REGRESSION, Part 2**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Feb. 15) • Homework (due Sunday Feb. 16) • Quiz (due Sunday Feb. 16)
Week 5 Feb. 17 - 23	• **LOGISTIC REGRESSION**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Feb. 22) • Homework (due Sunday Feb. 23) • Quiz (due Sunday Feb. 23)

Week 6 Feb. 24 – Mar. 1	• **SURVIVAL ANALYSIS**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Feb 29) • Homework (due Sunday Mar. 1) • Quiz (due Sunday Mar. 1)
Week 7 Mar. 2 - 8	• **PROJECT 1**		• Project 1 (due Sunday Mar. 8)
SPRING BREAK Mar. 9 - 15			
Week 8 Mar. 16 - 22	• **PROPORTIONAL HAZARDS REGRESSION**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Mar. 21) • Homework (due Sunday Mar. 22) • Quiz (due Sunday Mar. 22)
Week 9 Mar. 23 - 29	• **POWER AND SAMPLE SIZE ESTIMATION**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Mar. 28) • Homework (due Sunday Mar. 29) • Quiz (due Sunday Mar. 29)
Week 10 Mar. 30 – Apr. 5	• **COVID-19 Mental Health Break**		
Week 11 Apr. 6 - 12	• **POISSSON REGRESSION**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Apr. 11) • Homework (due Sunday Apr. 12) • Quiz (due Sunday Apr. 12)
Week 12 Apr. 13 - 19	• **SURVEY SAMPLING AND ANALYSIS**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Apr. 18) • Homework (due Sunday Apr. 19) • Quiz (due Sunday Apr. 19)

Week 13 Apr. 20 - 26	• **OTHER REGRESSION MODELS**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday Apr. 25) • Homework (due Sunday Apr. 26) • Quiz (due Sunday Apr. 26)
Week 14 Apr. 27 – May 3	• **SPECIAL TOPICS I:**	**Online Lectures**	• Software Lesson • Problem Set activity • Contribution to Problem Set collaborative key (due Saturday May 2) • Homework (due Sunday May 3) • Quiz (due Sunday May 3)
Week 15 May 4 - 10	• **PROJECT 2**		• Project 2 (due Sunday May 10)

SPH AND UNIVERSITY POLICIES & RESOURCES

The School of Public Health maintains up-to-date information about resources available to students, as well as formal course policies, on our website at www.sph.umn.edu/student-policies/. Students are expected to read and understand all policy information available at this link and are encouraged to make use of the resources available.

The University of Minnesota has official policies, including but not limited to the following:

- Grade definitions
- Scholastic dishonesty
- Makeup work for legitimate absences
- Student conduct code
- Sexual harassment, sexual assault, stalking and relationship violence
- Equity, diversity, equal employment opportunity, and affirmative action
- Disability services
- Academic freedom and responsibility

Resources available for students include:

- Confidential mental health services
- Disability accommodations
- Housing and financial instability resources
- Technology help
- Academic support

EVALUATION & GRADING

There are 570 total points in this course. Grading is determined by:

- **Weekly work** (Total: 330 points, 58%)
    - Active and timely participation in 11 of the 12 Problem Set Collaborative Keys (5 points each, Total: 55 points, 9%)
    - Best 11 of 12 Quizzes (15 points each, Total: 165 points, 30%)
    - Best 11 of 12 Homework Assignments (10 points each, Total: 110 points, 19%)
- **Projects** (Total: 240 points, 42%)
    - Project 1 (Total: 120 points, 21%)
    - Project 2 (Total: 120 points, 21%)

Grading Scale
The University uses plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following, and you can expect the grade lines to be drawn as follows:

% In Class	Grade	GPA
93 - 100%	A	4.000
90 - 92%	A-	3.667
87 - 89%	B+	3.333
83 - 86%	B	3.000
80 - 82%	B-	2.667
77 - 79%	C+	2.333
73 - 76%	C	2.000
70 - 72%	C-	1.667
67 - 69%	D+	1.333
63 - 66%	D	1.000

< 62%	F	

- A = achievement that is outstanding relative to the level necessary to meet course requirements.
- B = achievement that is significantly above the level necessary to meet course requirements.
- C = achievement that meets the course requirements in every respect.
- D = achievement that is worthy of credit even though it fails to meet fully the course requirements.
- F = failure because work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (Incomplete).
- S = achievement that is satisfactory, which is equivalent to a C- or better
- N = achievement that is not satisfactory and signifies that the work was either 1) completed but at a level that is not worthy of credit, or 2) not completed and there was no agreement between the instructor and student that the student would receive an I (Incomplete).

Evaluation/Grading Policy	Evaluation/Grading Policy Description
Scholastic Dishonesty, Plagiarism, Cheating, etc.	We expect that students will complete all homework assignments and quizzes INDEPENDENTLY, without assistance from any other people. If we have any reason to suspect that a student gave assistance on a quiz to another student or received assistance on a quiz from another student or a person outside the class, all students involved will receive a score of zero on that quiz. If we believe that scholastic dishonesty has occurred, we are required by the University to report the incident to the Office of Community Standards (https://communitystandards.umn.edu/). You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis (As defined in the Student Conduct Code). For additional information, please see https://z.umn.edu/dishonesty The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: https://z.umn.edu/integrity. If you have additional questions, please clarify with your instructor. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam. Indiana University offers a clear description of plagiarism and an online quiz to check your understanding (http://z.umn.edu/iuplagiarism).
Late Assignments	This course covers a large amount of material in a short time. The group and class activities depend on the active and timely participation of all students. Therefore late assignments or quizzes will not be accepted. For every day a Project assignment is late, you will be docked 20% of the grade.