Introduction to Biostatistics

University of Iowa
BIOS:4120 Spring 2020
Credit: 3 s.h.

Lecture:	9:30 a.m - 10:50 a.m. Tuesday & Thursday CPHB N110	**Instructor:** **Office:** **Phone:** **e-mail:** **Office hours:**	Prof. Patrick Breheny N336 CPHB 384-1584 patrick-breheny@uiowa.edu Mon. 1:00 p.m. – 2:30 p.m. Wed. 2:00 p.m. – 3:30 p.m.
Section A01:	11:00 a.m – 11:50 a.m. Tuesday CPHB C201	**TA:** **e-mail:** **Office hours:**	Michelle Smith michelle-smith-2@uiowa.edu Mon. 10:00 a.m. – 12:00 p.m. Wed. 4:30 p.m. – 5:15 p.m. Thu. 11:00 a.m. – 12:15 p.m.
Section A02:	11:00 a.m – 11:50 a.m. Tuesday CPHB C401	**TA:** **e-mail:** **Office hours:**	Linder Wendt linder-wendt@uiowa.edu Mon. 11:00 a.m. – 1:00 p.m. Tue. 4:30 p.m. – 5:30 p.m. Thu. 3:00 p.m. – 4:00 p.m.
Section A03:	3:30 p.m - 4:20 p.m. Tuesday CPHB C401	**TA:** **e-mail:** **Office hours:**	Linder Wendt linder-wendt@uiowa.edu See above
Section A04:	3:30 p.m - 4:20 p.m. Wednesday CPHB C401	**TA:** **e-mail:** **Office hours:**	Michelle Smith michelle-smith-2@uiowa.edu See above

All TA Office hours will be held in CPHB S251. If you are unable to make it to office hours, feel free to contact one of us to set up an appointment.

Course description: This is an introductory course that covers the primary statistics concepts and methods used in medicine, public health, and the biological sciences. The objectives for this course are for you to be able to:

- Think statistically – to understand the importance of collecting data and using appropriate statistical methods in order to test hypotheses, estimate unknown quantities, and conduct research
- Analyze data using basic statistical methods
- Recognize the strengths and limitations of those methods
- Better comprehend journal articles containing statistical analyses

- Have the necessary background to enroll in Regression & ANOVA in Health Sciences (BIOS 5120)

Suggested text: No text is required in this course; the notes are self-sufficient. However, some students like to purchase a textbook for (a) additional problems/exercises/examples or (b) another perspective or explanation of a topic. I suggest the following two texts:

- Daniel, W. (2013): *Biostatistics: A Foundation for Analysis in the Health Sciences (Tenth Edition)*. Wiley.
- Motulsky, H. (2017): *Intuitive Biostatistics (Fourth Edition)*. Oxford University Press.

The book by Daniel provides hundreds of additional examples and problems. In my opinion, it a very good book for purpose (a) above. The book by Motulsky attempts to get across the ideas of statistics using verbal explanations and examples rather than equations, and is a very good book for purpose (b) above. The book does not, however, have problems, solutions, and exercises.

Prerequisite: College algebra.

Course website: The schedule of topics for the course, as well as notes, assignments, labs, data sets, and other relevant materials is available on the course web site:
`http://myweb.uiowa.edu/pbreheny/4120/s20`

Assignment scores and solutions will be made available via ICON: `https://icon.uiowa.edu`

Homework: There will be one homework assignment per week, due the following week at the beginning of class on Tuesday. Graded assignments will be returned in lab. Solutions will be posted to ICON on Tuesday afternoons. Clearly, no homework can be accepted after that (see the section on grading for ramifications).

You are encouraged to work in groups of two or three, and turn in one copy of the homework per group. I have found this to work very well in the past, as group discussions are valuable for retention and understanding of the material, and working well in a group is a vital part of being a professional. If you would like help in finding a group, please send your TA an e-mail.

Computing: Homework for this course will occasionally involve the use of a computer for data analysis. You may use any statistical software you would like for this analysis, although the software that we will be cover in lecture/lab is `R`. `R` is free, open-source software and runs on all operating systems (Windows/Mac/Linux).

Exams: There will be four quizzes and a final exam in this class. Quizzes will replace the last half-hour of lecture on the following dates:

Quiz 1	February 13
Quiz 2	March 5
Quiz 3	April 9
Quiz 4	April 30

The final, which will be comprehensive, will take place during finals week, although the University has yet to determine the time and date.

All examinations (quizzes and final) are open-book, open-note. However, you may not use a laptop, cellphone, or any device capable of communication or internet access. Also, you will be asked to perform calculations on these quizzes, so bring a calculator with you (again, your phone is not an acceptable substitute for a calculator during an exam).

Grading: Your grade will be based on a weighted average of homework (26%), quizzes (37%), and the final exam (37%). Each homework assignment is worth 2% of your grade. If you fail to turn in a homework assignment, that 2% of weight is added to the quizzes and final exam (each getting 1%). For example, suppose you only turn in 11 of the 13 homework assignments; in that case, homework would be worth 22% of your final grade, and quizzes and the final exam each worth 39%. In the event that a grade on a homework assignment is lower than your quiz/final average, that homework will be automatically dropped – i.e., turning in homework cannot hurt your final grade in this course. The grading scale for the course is as follows:

90-100	A	70-75	B-
85-90	A-	55-70	C
80-85	B+	< 55	F
75-80	B		

Attendance: Regular attendance in this course is expected. No direct penalty will be applied for missing lectures. However, assignments, quizzes, and the final will be based entirely on lecture material, so skipping lecture is likely to hurt your grade (and, of course, your understanding of the material).

Corrections: Despite my best efforts, my notes occasionally have mistakes. If you spot a mistake, I very much want you to let me know about it so that I can correct it. I will award two bonus points (to be added to your homework total) for pointing out a typographical error and five bonus points for an error in content. Corrections will be made to the online version of the notes and (for meaningful errors) described on the course home page. Once an error has been corrected online, no more bonus points for that mistake are available.

Electronic communication: I will occasionally send notices to the class through e-mail (to your `uiowa.edu` account), so please check that account regularly.

Academic misconduct: You are allowed (encouraged!) to work together on homework assignments. In addition, quizzes and the final exam are open-book, open-note. However, you are not allowed to copy off another student during exams, or use a cell phone or any device capable of messaging, texting, or accessing the internet. Any of these actions will be considered cheating. The University of Iowa takes cheating on examinations very seriously. You can read more about the consequences of academic misconduct at http://dos.uiowa.edu/policies/academic-misconduct.

I look forward to getting to know you, and I hope that we have a great semester together.

Public Health Competencies: Successful students in this course will learn to do the following:

1. Describe the role of biostatistics in the Public Health discipline
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. Apply basic informatics techniques with vital statistics and public health records in the description of public health characteristics and in public health research and evaluation.
9. Interpret results of statistical analyses found in public health studies.

Concerns: Students with suggestions or complaints should see me first, and if we cannot come to an agreement, I will direct you to the Departmental DEO, Prof. Joseph Cavanaugh, N332 CPHB, `joe-cavanaugh@uiowa.edu`. Students may also contact the Undergraduate Program Director (if appropriate) or the Associate Dean for Academic Affairs in the College of Public Health. Another resource for students is the Office of the University Ombudsperson. If a complaint cannot be resolved at the departmental and/or collegiate level, students may file a formal complaint utilizing the procedure specified in Section II, Chapter 29.7 of the Operations Manual: http://opsmanual.uiowa.edu.

Accommodations for students with disabilities: The University of Iowa is committed to providing an educational experience that is accessible to all students. If you have a diagnosed disability or any other condition that would impair your ability to complete the course requirements as stated above, please inform me as early in the semester as possible, preferably at least two weeks prior to the scheduled activity. Students needing accommodations must register with Student Disability Services, (SDS): https://sds.studentlife.uiowa.edu/students/apply to obtain a Letter of Accommodation (LOA). The office is located at 3015 Burge Hall (319.335.1462). Students with complaints about disability accommodation should notify Student Disability Services and may be counseled to file a complaint with the Office of Equal Opportunity and Diversity. Read more about Disability Resources at https://diversity.uiowa.edu/disability-resources.

Administrative home: This course is given by the College of Public Health. This means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College of Public Health. Students wishing to add or drop this course after the official deadline must receive the approval of the Associate Dean for

Academic Affairs in the College of Public Health. Details of the University policy of cross enrollments may be found at: https://www.provost.uiowa.edu/sites/provost.uiowa.edu/files/crossenroll.pdf.

Severe weather: In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit http://hawkalert.uiowa.edu.

Sexual harassment/misconduct: The University of Iowa prohibits sexual misconduct, dating/domestic violence, and stalking in any form, including sexual assault or sexual harassment, and any form of nonconsensual sexual conduct. Students should be able to live, study, and work in an environment free from all forms of sexual misconduct, dating/domestic violence, and stalking. Incidents of sexual misconduct can be reported to the Office of Sexual Misconduct Response Coordinator (OSMRC) or to the Department of Public Safety (DPS). If you are uncertain if what you have experienced from a student is sexual misconduct, see Section IV, Chapter 2 of the operations manual. If you are uncertain if what you experienced from a faculty or staff member is sexual harassment, see Section II, Chapter 4 of the operations manual. Students impacted by a Title IX issue (sexual misconduct, dating/domestic violence, or stalking) may be eligible to request an academic accommodation. Contact the OSMRC for assistance, definitions, and the full University of Iowa policy. If you or someone you know experiences sexual assault, sexual harassment, dating/domestic violence, stalking, or any other behaviors prohibited under this policy, you are strongly encouraged to seek assistance and support. See below for link to confidential resources.

- OSMRC: https://osmrc.uiowa.edu
- DPS: https://police.uiowa.edu
- Operations manual: https://opsmanual.uiowa.edu
- Confidential support: https://osmrc.uiowa.edu/victim-resources/confidential-support

Mental health: Students are encouraged to be mindful of their mental health and seek help if they are feeling overwhelmed and/or incapable of meeting course expectations. For assistance with the class, students are encouraged to talk to me. For additional support and counseling, students are encouraged to contact The University Counseling Service (UCS) in 1950 University Capital Centre Suite or 3223 Westlawn South. Call 319.335.7294 to schedule appointments. Find out more about the UCS at http://counseling.uiowa.edu. After hours, call the Johnson County Crisis Line at 319.351.0140 or 911 if you are having a mental health emergency.

Nondiscrimination in the Classroom and the College: The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity at diversity.uiowa.edu. Students are invited to optionally share their preferred names and pronouns with their instructors and classmates. Students are also able to state this information in the MyUI system under Student Information. https://myui.uiowa.edu/my-ui/student/records/documents/preferred-name-pronoun.page