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| <b>Course Title</b>                      | <b>Introduction to Biostatistics</b>  |  |
| <b>Course Number</b>                     | <b>Biostatistics 100A</b>   |  |
| <b>Credit</b>                            | 4 units   |  |
| <b>Term</b>                              | Spring 2020   |  |
| <b>Meeting Day/ Location</b>             | MWF 8-9:50, online (Zoom invite on course website at ccle.ucla.edu)   |  |
| <b>Instructor Information</b>            | <p><b>Martin L. Lee, PhD, CStat, CSci, FIBMS</b><br/>         Department of Biostatistics<br/>         School of Public Health<br/>         University of California, Los Angeles<br/>         Phone: (626) 599-9260<br/>         Email: <a href="mailto:mlee@prolacta.com">mlee@prolacta.com</a> or <a href="mailto:martin.l.lee@att.net">martin.l.lee@att.net</a> (Twitter:@StatDrML)<br/>         Office hours: to be determined online</p>  |  |
| <b>Course Description</b>                | <p>Sampling situations, with special attention to those occurring in biological sciences. Topics include distributions, tests of hypotheses, estimation, types of error, significance and confidence levels, sample size.</p> <p>Academic Integrity:<br/>         In line with University policy, the guidelines and policy for academic integrity will be enforced. Please see the policy found at the following link for the policy provisions:<br/> <a href="http://www.deanofstudents.ucla.edu/StudentGuide.pdf">http://www.deanofstudents.ucla.edu/StudentGuide.pdf</a></p> <p>Attendance and Class Participation Policy:<br/>         Class attendance is an important and necessary element of the class participation grade. Since the class meets only once/week, each session is critical. All students are expected to <b>complete the reading and assignment before coming to class</b>, ask relevant questions, and contribute to the group discussion. Much of what we do in class is made more interesting and relevant by class interactions.</p> |  |
| <b>Learning Objectives/ Competencies</b> |   |  |
|  | <i>Learning Objectives</i>  | <i>ASPH Competencies</i>   |
|  | 1. Introduction to statistics and its utility in the scientific, particularly the public health, environment.   | C1. Upon completion of this course, students will be able to describe the roles biostatistics serves in the discipline of public health. |

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|  | <p>2. Develop analytical skills involving distributions and measures of central tendency and spread. Understand basic informatic techniques and they can be applied to public health situations.</p>     | <p>C2. Upon completion of this course, students will be able to distinguish among the different measurement scales and the implications for statistical descriptive methods to be used based on these distinctions.</p> <p>C3. Upon completion of this course, students will be able to apply descriptive techniques commonly used to summarize public health data.</p> <p>C5. Upon completion of this course, students will be able to 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.</p> |
|  | <p>3. Understand the basic concepts of probability with respect to how they apply to the fundamental interpretation of statistical data and sampling distributions.</p>                                  | <p>C4. Upon completion of this course, students will be able to describe basic concepts of probability.</p>  |
|  | <p>4. To develop analytical skills involving the normal distribution and other key probability distributions.</p>  | <p>C6. Upon completion of this course, students will be able to describe basic concepts of random variation and commonly used statistical probability distributions.</p>   |
|  | <p>5. To understand the concepts of estimation, confidence and confidence intervals and how they are used in statistical inference. To understand the difference between confidence and probability.</p> | <p>C7. Upon completion of this course, students will be able to interpret results of statistical analyses found in public health studies.</p> <p>C8. Upon completion of this course, students will be able to apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.</p>  |

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|   |  | C10. Upon completion of this course, students will be able to develop written presentations based on statistical analyses for both public health professionals and educated lay audiences.   |
|   | 6. To infer single population means with point and interval estimates. To perform hypotheses tests and to interpret their results for a data set. To compare two population means with point and interval estimates. To perform hypotheses tests on the difference of two population means.  | C7. Upon completion of this course, students will be able to interpret results of statistical analyses found in public health studies.<br><br>C8. Upon completion of this course, students will be able to apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.<br><br>C10. Upon completion of this course, students will be able to develop written presentations based on statistical analyses for both public health professionals and educated lay audiences. |
|   | 7. Introduction to techniques of statistical inference that do not require the use of standard assumptions such as the normal distribution.  | C9. Upon completion of this course, students will be able to describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.   |
| <b>Required Texts/ Recommended Readings</b> | There are two texts for the course; both are recommended (the designation in parentheses refers to the reading assignments indicated below):<br>Text: Whitlock MC, Schluter D. The Analysis of Biological Data, 2 <sup>th</sup> ed. Roberts and Company, 2015 (WS).<br><br>Reader: Biostat 100A Course Reader (Reader). Can be purchased at: <a href="https://ucla.redshelf.com/book/156538">https://ucla.redshelf.com/book/156538</a> |  |
| <b>Methods of Evaluation</b>                | There will be 3 separate sets of assignments:<br><br>1) “Laboratory” assignments which involve evaluating computer output, doing some online research and examining some relevant publications for statistical content. These will focus on different ASPH Competencies. They will be distributed as appropriate. These will be due at various points during the quarter and these deadlines will be announced as relevant.            |  |

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|                                      | <p>2) Midterm examinations: The first will be given on Friday, May 1st and the second will be given on Friday, May 22nd, both given online.</p> <p>3) Final examination: This will be given on Tuesday, June 9th from 6:30-9:30pm.</p>  |
| <b>Grade Distribution</b>            | <p>Laboratory assignments: all of these must be completed in order to receive a class grade</p> <p>50% Midterm exams (25% for each; however, if the final % is greater than the worse of the two midterms, then that midterm will be dropped and the final will count 75%)</p> <p>50% Final exam</p>                        |
| <b>Grading</b>                       | <p>The class will be graded on a straight scale: 90% and above will be an A; 80% and above will be a B; 70% and above will be a C. The addition of a + or – with the grade for students just below this threshold will be at the discretion of the instructor and will depend on progression throughout the quarter.</p>    |
| <b>Course Schedule/<br/>Readings</b> | <p>The readings indicated below refer either to the textbook (WS) or the reader. Since the lectures move at a rate relevant to the class discussions and level of material, no specific dates are indicated for each topic. (Note there is a handout that will be provided, and this will be found on the CCLE website)</p> |
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| <b>Topics</b>                        | <b>Reading</b>                      | <b>Homework</b>        |
|--------------------------------------|-------------------------------------|------------------------|
| Introduction                         | WS: Ch. 1-pg.1-16                   |                        |
| Types of data                        | Reader: Ch. 2, WS: Ch. 1-pg. 11-13  | Handout, WS: Ch.1-1,7  |
| Introduction to sampling             | WS: Ch. 1-pg.3-11                   | WS: Ch.1-2,4,11        |
| Data display                         | WS: Ch. 2-pg.25-38                  | WS: Ch. 2-3,10,15      |
| Measures of location and variability | WS: Ch. 3-pg.65-82<br>Reader: Ch. 4 | WS: Ch. 3-1,3,5,7,8    |
| Parameters and statistics            | WS: Ch.4-pg. 96-97                  |                        |
| Sampling distributions               | SWS: Ch. 4-pg.95-106                | WS: Ch. 4-1a-c,6a-c,13 |

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|   | Reader: Ch. 5  |   |
| Probability and the normal distribution | Reader: Ch. 6<br>WS: Ch. 5-pg. 117-118; Ch. 10-pg.273-288                          | WS: Ch. 10-1,3,4,6,8,13                                   |
| Confidence intervals                    | WS: Ch. 4-pg. 102-104; Ch. 11-pg.303-309<br>WS: Ch.14-pg. 442-444<br>Reader: Ch. 7 | WS: Ch. 4-1d,6d,7,10; Ch. 11-1a-i,5,8a-d                  |
| Hypothesis testing: 1 population        | WS: Ch. 6-pg.149-168; Ch. 11-pg.310-314  | WS: Ch. 6-1-8,10,12<br>Ch. 11-1j-n,13                     |
| Hypothesis testing: 2 populations       | WS: Ch. 12-pg.327-347  | WS: Ch.12-1,2,4,5,6,12                                    |
| Inferences on categorical data          | WS: Ch. 7:179-180,183-185, 188-191<br>WS: Ch. 8: 205-214<br>WS: Ch. 9: 235-257     | WS: Ch. 7-4,5,10,14,17<br>WS: Ch. 8-9<br>WS: Ch. 9-2,8,13 |

Also, consider Review questions in the first part of the Reader

## Lecture Schedule

Week 1: Class on 3/30, 4/1

Week 2: Class on 4/6, 4/8

Week 3: Class on 4/13, 4/15

Week 4: Class on 4/20, 4/22

Week 5: Class on 4/27, midterm on 5/1

Week 6: Class on 5/4, 5/6, and 5/8

Week 7: Class on 5/11, 5/13

Week 8: Class on 5/18, 5/20, midterm on 5/22

Week 9: Holiday on 5/25, class on 5/27

Week 10: Class on 6/1, 6/3

Final: 6/9