

# INTERMEDIATE BIOSTATISTICS FOR PUBLIC HEALTH RESEARCH

## EAB 791

### Textbook

#### REQUIRED:

Larry Hatcher (2013). Advanced Statistics in Research: Reading, Understanding, and Writing Up Data Analysis Results. Shadow Finch Media LLC.

#### OPTIONAL:

Ron Cody (2011). SAS Statistics by Example, 1<sup>st</sup> Edition. SAS Institute.

### Course Description & Objectives

#### COURSE DESCRIPTION:

Designed to train analytic capability with advanced statistical approaches, including the generalized linear/mixed/additive model, logistic regression, multivariate analysis, and power analysis. Methodological knowledge, statistical programming, and explaining statistical outputs will be instructed. SAS codes will be provided.

#### COURSE PREREQUISITES:

EAB 703 – Biostatistical Methods for the Health Sciences

#### COURSE OBJECTIVES AND EXPECTED LEARNING OUTCOMES:

By the end of this course, students will be able to:

| Objective/Outcome  | Competency |
|--|------------|
| 1. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate | MPH 03     |
| 2. Interpret results of data analysis for public health research, policy or practice   | MPH 04     |

- |   |            |
|---|------------|
| 3. Demonstrate excellence in applying the theoretical and problem solving aspects of public health within epidemiology and biostatistics.                                     | PhD EAB 02 |
| 4. Appraise how quantitative and qualitative data can be integrated into mixed methods in epidemiologic research and effectively calculate advanced epidemiological measures. | PhD EAB 04 |
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## Course Evaluation & Grades

### ATTENDANCE & PARTICIPATION

This course is designed with practical application in mind, including the use of computer software to analyze new datasets and the critical review of statistical analyses appearing in the scientific literature. Participation is essential! Students will be expected to attend all classes and to participate via questions and discussion.

### PROBLEM SET (140 PTS)

Seven problem sets are composed by the examples and extra practices in each handout. These are designed to reinforce the understanding in course materials learned during each lecture. They will emphasize practical application of the material that we discuss in class, especially in computer computations and programming. Reading assignments will also be included in some problem sets. Each problem set must be finished and uploaded to WebCampus before the next problem set is released. The total point of each problem set is 20.

### FINAL PROJECT (60 PTS)

The object of the take-home final project is assessing students' understanding of all contents of this course. A data set will be provided in the second to last lecture, so students will have at least two weeks to accomplish the final project. Students need to use a student ID to randomly select samples from the data set to assure that every student has the data distinguished from the others. Several questions will be proposed to cover the whole contents of this course, and students will need to use SAS to analyze the selected data. For more details refer to the final project guide provided along with the final project.

### ASSIGNMENT OF GRADES

Grades are assigned according to the tables below. Missing problem sets or final project will be assigned a grade of 0 points.

| Evaluation method | Total points | Percent of total |
|-------------------|--------------|------------------|
|-------------------|--------------|------------------|

|               |            |             |
|---------------|------------|-------------|
| Problem sets  | 140        | 70%         |
| Final project | 60         | 30%         |
| <b>TOTAL</b>  | <b>200</b> | <b>100%</b> |

| Grade | Required Points | Required Percentage |
|-------|-----------------|---------------------|
| A     | 188 – 200       | 94 – 100            |
| A-    | 180 – 187       | 90 – 93.9           |
| B+    | 174 – 179       | 87 – 89.9           |
| B     | 160 – 173       | 80 – 86.9           |
| C     | 150 – 159       | 75 – 79.9           |
| D     | 140 – 149       | 70 – 74.9           |
| F     | <140            | < 70                |

## Tentative Course Schedule

| Week | Topic  | Problem Set |
|------|--|-------------|
| 1    | Introduction                                     |             |
| 2    | The $s \times r$ Table                           | 1           |
| 3    | The $s \times r$ Table                           |             |
| 4    | Logistic regression I                            | 2           |
| 5    | Logistic regression II                           |             |
| 6    | Generalized linear regression I                  | 3           |
| 7    | Generalized linear regression II                 |             |
| 8    | Factor analysis and Principle component analysis | 4           |
| 9    | Discriminant analysis and cluster analysis       |             |
| 10   | Survival model                                   | 5           |
| 11   | Generalized linear mixed model I                 | 6           |
| 12   | Generalized linear mixed model II                |             |
| 13   | Generalized additive model                       | 7           |
| 14   | Power analysis                                   |             |

***Dr. Chien reserves the right to change the schedule and requirements for this course; appropriate notice of any changes will be made during scheduled classes. Assignments completed for this course may be used as evidence of student learning in accreditation reports. Students who do not wish their work to be used for accreditation purposes must inform the course instructor in writing by the end of late registration. Your participation and cooperation are appreciated.***

## Additional Course Information

**Academic Misconduct**—Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the *Student Academic Misconduct Policy* (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>.

**Copyright**—The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you, nor assume any responsibility for employee or student violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

**Disability Resource Center (DRC)**—The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

**Final Examinations**—The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

**Incomplete Grades**—The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving "I" grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

**Library Resources**—Students may consult with a librarian on research needs. Subject librarians for various classes can be found here: [https://www.library.unlv.edu/contact/librarians\\_by\\_subject](https://www.library.unlv.edu/contact/librarians_by_subject). UNLV Libraries provides resources to support students' access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

**Rebelmail**—By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and

announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always [@unlv.nevada.edu](mailto:@unlv.nevada.edu). **Emailing within WebCampus is acceptable.**

**Religious Holidays Policy**—Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

**Transparency in Learning and Teaching**—The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:

<https://www.unlv.edu/provost/teachingandlearning>

<https://www.unlv.edu/provost/transparency>

**Tutoring and Coaching**—The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call [702-895-3177](tel:702-895-3177). The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC **A** (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TBE second floor.

**UNLV Writing Center**—One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>.

**Any other class specific information**—(e.g., absences, make-up exams, status reporting, extra credit policies, plagiarism/cheating consequences, policy on electronic devices, specialized department or college tutoring programs, bringing children to class, policy on recording classroom lectures, etc.)