# BIOSTATISTICS 500H – INTRODUCTION TO BIOSTATISTICS
# Fall 2013

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| **Instructor:** | Dr. Jane Monaco |
| **Instructor Contact Information:** | jmonaco@bios.unc.edu<br>3107D McGavran-Greenberg |
| **Lecture Hours/ Office Hours:**<br>**Teaching Assistant:** | Required Lectures:      T/Th 11-12:15     McG 2308<br>Optional Office Hours:   Tues 12:15- 1:15  Location:  McG 3504D<br>(To be named)<br>Optional Office Hours:  (To be announced) |
| **Short Course Description:** | Bios  500H is an introductory course in probability, data analysis, and statistical inference designed for the background of BSPH Biostatistics students.  Topics include sampling design, descriptive statistics, probability, confidence intervals, tests of hypotheses, chi-square distribution, sets of 2-way tables, power, sample size, ANOVA, non-parametric tests, correlation, linear regression, and survival analysis using SAS software. |

**Topics:**

- Sampling
- Descriptive statistics
- Data Presentation
- Design of experiments
- Probability
- Common Distributions (normal, binomial, chisquare)
- Confidence Intervals (means and proportions)
- Hypothesis testing (means and proportions)
- Sets of 2-way tables
- Ethics
- Power
- ANOVA
- Non-parametric tests (Wilcoxon Rank Sum)
- Fishers Exact Test
- Linear regression
- Correlation
- Survival analysis
- Odds ratios
- Relative risk

**Prerequisites:**   Math 231 and 232
Co-requisite Bios 511 is recommended
Access to SAS software and MS Excel is required
A previous course in statistics (such as AP Statistics or STOR 151) is helpful but not required
Instructor permission is required for registration of non-majors

**Course Goals:**     At the conclusion of the course, the learner will be able to:

- Select and apply appropriate statistical tests to analyze common biological and health data
- Understand the assumptions for common statistical methods
- Produce appropriate statistical graphs and descriptive statistics
- Interpret the statistical output from common statistical tests
- Communicate (orally and in writing) results clearly for a non-statistical audience
- Understand statistical methods sections and results sections of many medical journal articles
- Use SAS programming skills (and occasionally Excel) to produce statistical output from common statistical tests

In addition to a rigorous treatment of introductory statistical concepts beyond the traditional non-majors first semester course, students explore current controversies, ethical questions, and common errors in the medical literature through a variety of readings and a project.

**Accessing SAS software:**     Students need access to SAS software.
Please see separate document available in Sakai for instructions about getting access to SAS.

**Textbook:**     Required:
- Principles of Biostatistics (2nd edition) by Pagano and Gauvreau

Other helpful books:
- Fundamentals of Biostatistics (7th edition) by Rosner
- The Little SAS Book (5th) Delwiche
- Applied Statistics and the SAS Programming Language (5th) Cody
- Statistical Programming in SAS by John Bailer

**Grading Policy:**

| Weighting of Assignments: | | Scale: | |
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| Homework: | 10% | A | [93.0, 100) |
| Participation/Attendance: | 10% | B+ | [90.0, 93.0) |
| Project: | 10% | B | [83.0, 90.0) |
| Midterm 1: | 20% | C+ | [80.0, 83.0) |
| Midterm 2: | 25% | C | [73.0, 80.0) |
| Final Exam: | 25% | D | [65.0, 73.0) |
| | | F | <65.0 |

\* The tests (midterms and final) will each have an in-class portion and a take-home portion.
Course calendar available in separate documentation in Sakai.

**STUDENT HONOR CODE:**

Tests: In- class Portion:
In-class tests must be completed independently with no access to other individuals, notes, books, or computer.  On your desk, you will be allowed to have a calculator and pencils. Scratch paper will be provided. Computers and cell phones must remain unavailable (for example, in your backpack) during in-class tests.
[The computer restriction may be relaxed as needed for Midterm 2 and Final Exam to allow access to a few statistical functions only.]

Tests: Take- home Portion:
Take-home portions of the tests must be completed without communicating with any person except possibly the instructor.
   Unacceptable:
- Communicating (verbal/ written/ electronic) with any other person (taking the course or not taking the course) about the test question(s) or any material covered in the test
- Accessing websites that have 'solution keys' such as chegg.com or that provide individual 'tutoring'
- Consulting tests from previous semesters of this course
   Acceptable:
- Contacting the instructor if you have questions
- Accessing own notes, books, computer software (SAS/Excel), some educational internet resources (such as Wikipedia, Khan Lectures,…)

Homework:
Students may verbally discuss homework assignment questions with each other.
Students may NOT copy (either electronically or by hand) homework answers from another student.  Examples of unacceptable conduct would include "cutting and pasting" material (including programming code) or copying answers by hand without independent verification.

Honor Code Adherence:
Students are expected to adhere to the honor code for every assignment and will sign the Honor Code statement with every graded assignment.

Consequences:
Any students suspected of academic misconduct will be referred to the Honor Court.   Honor Court sanctions can include receiving a zero for the assignment, failing the course and/or suspension from the University.
This instructor has, on several occasions, submitted students' information to the UNC-CH Honor Court.  The students were prosecuted, found guilty of academic misconduct and had serious penalties imposed for that conduct. For more information on the UNC Honor Code and the Honor Court see honor.unc.edu.

**Project:**    Students will be required to complete a project.
More information will be available in separate documentation and discussed in class.

**Homework Expectations:**    Homework is due at the beginning of class on the designated days listed on course calendar available in Sakai.  Homework will be checked for completeness, not correctness.
Scores for each assignment are:
 0 (minimal homework completed)
½ (approximately half homework completed)
1 (all or almost all homework completed)

**Homework Grade:**    Homework accounts for 10% of final course grade.
The lowest homework score will be dropped and the remainder of scores averaged.

**Participation Expectations:**    The format of this course is largely "flipped"; the lectures are recorded and available online, and classroom time is devoted to working problems and discussion.  Attendance, contributing to group class work, and coming to class prepared  (having watched assigned lectures) are required and essential in the success of the student.
No distinction is made for excused vs. unexcused absences.

**Participation/ Attendance Grade**    Participation/Attendance accounts for 10% of the final course grade.

| Participation/ Attendance Grade | 100 | 60 | 40 | 0 |
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| Attendance | Miss three or less classes | Miss four classes | Miss five classes | Miss more than five classes |

The instructor may adjust these values to reflect issues such as if a student comes to class unprepared or does not adequately contribute to group work during class time.

**Learning Latex:**    Consider learning LaTex, word processing/document preparation software which is useful in typing documents with many mathematical formulas.  The Odum Institutes offers a Latex workshop periodically.  Students are encouraged to complete some assignments in LaTex.

**Global Topics:** As part of their study of biostatistics, students will be exposed to a variety of global public health topics. In effort to enrich students' understanding of global public health issues, global content will be incorporated in a variety of ways, including "Global Health Activities", readings, lecture examples and test examples.

For the purposes of this course, global content will be defined as "health problems that transcend national boundaries, that may be influenced by circumstances or experiences in other countries, and that are best addressed by cooperative actions, and solutions," whether they occur in developing countries, countries in advanced transition, or industrialized countries. *Source: Institute of Medicine, America's Vital Interest in Global Health, Washington DC, National Academies Press, 1997.*

Within many units, Global Health Activities will be used to highlight important statistical concepts using examples and journal articles centered

on global health topics. Watch for this symbol, , to indicate that global content is being incorporated.

**Make up Tests/ Late Assignments:** <u>Make-up in-class tests:</u> In-class tests dates are announced well in advance. Make-up in-class tests will be given only for documented reasons such serious illness or family emergency.

<u>Late take-home tests:</u> There is a penalty for turning in take-home portions of tests late; ten percent of the value of the test is deducted for each day (or portion of day) late. After 24 hours, the grade is 0 if the student has not contacted the instructor. Technical reasons (computer hard drive failure, printing issues) are not valid excuses for late submission of take-home portions of tests.

<u>Late homework:</u> Homework is due at the beginning of the period of the designated day. No late homework is accepted.

**Accommodations:** The instructor will provide accommodations for students registered with UNC Accessibility Resources and Services with written documentation.

The instructor will also provide accommodations (make-up tests, adjustment of due dates) for religious observances with documentation.

**Class Rules and Etiquette:**

IN-CLASS ELECTRONIC POLICY:
- Put Cell Phone on Vibrate (acceptable if you are expecting important call) or Turn it OFF (preferable). Keep cell phone out of sight. In case of an emergency call, leave class quietly and return.
- No texting.
- <mark>Use Laptop for taking notes and classwork ONLY. SAS and Excel may be open during class. Browsers (Chrome, Explorer, Safari..) only open for class questions or to access Sakai course website. No other applications (email, twitter, Facebook, shopping,…) should be open on your computer during class.</mark>

Consequences for above behaviors - First offense: warning. Second offense: I will confiscate your device and you may pick it up in my office after class. Subsequent offense: You may pick up your device from our department chair.

IN CLASS OTHER POLICIES:
- Absolutely no recording devices are allowed.
- Come to class prepared, having watched the assigned lectures.
- Bring pencil, completed lecture notes, calculator, laptop.
- Contribute to group work and presenting to class on occasion.

OUT OF CLASS:
When possible, please try to utilize designated course time (such as office hours and class time) for questions and concerns rather than last minute email questions to the instructor.

**Reuse of Materials:**

The materials for this course are to be used only for students currently enrolled in the course for purposes associated with this course. Materials should not be retained or further disseminated.

For example, journal articles and electronic copies of lectures should not be retained after the course is completed.
Please don't transmit or post materials from this course – they are for your personal use only during this semester. Please don't share materials (such as tests, homework, projects) with any other individuals including students who may take the course in the future.

**Getting Help/ Communication:**

Questions or concerns about the content of the material:
1. TA should be the "first stop" for homework questions- take advantage of TA's Office Hours!
2. Take advantage of Instructor's Office Hours.
3. Email instructor (if the above options have been tried already).

Questions or concerns about grading, scheduling, administrative issues can

be directed to the instructor (in person -  before or after class or by email) In person (before/after class or office hours) and email (not phone calls) are the preferred methods of communication.

**Course Evaluation**     Students are expected to complete the online course evaluation at the end of the semester.   The course evaluations are enormously important.  Class time will be provided.

**CEPH Competencies:**     This course meets the CEPH (Council on Education for Public Health) Competencies:

- Describe the roles biostatistics serves in the discipline of public health.
- Describe basic concepts of probability, random variation and commonly used statistical probability distributions.
- Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
- Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
- Apply descriptive techniques commonly used to summarize public health data.
- Apply common statistical methods for inference.
- Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
- 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.
- Interpret results of statistical analyses found in public health studies.
- Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences.

Updated: August 15, 2013