

**The University of Jordan**  
**Faculty of Medicine**  
 Second Academic Semester 2016-2017  
Course Syllabus

**Course Title:** Biostatistics for Medical Science  
**Allocation:** 3<sup>rd</sup> Year.  
**Faculty:** **Mahmoud Al-Hussami, D.Sc., Ph.D., Epidemiologist**  
                     Office Phone: 5355000 - 23138  
                     Email: [m.alhussami@ju.edu.jo](mailto:m.alhussami@ju.edu.jo)  
                     Semester Hours: Mondays (11-12noon) & Tuesdays (1-2pm).  
   Otherwise, ONLY by an appointment  
**Course Time:** Sunday & Thursday: 9:00 – 11:00am

***Course Description***

This course emphasize on the nature and characteristics of the most commonly used statistical techniques (data collection, sampling principles, graphical techniques for data display, probability distributions, parametric estimation and testing techniques, simple linear regression and correlation, multiple regression, categorical data analysis, and ANOVA), and their applicability to specific health care problems within the context of medicine. Statistical concepts will be presented and enhanced through the use of numerous “real life” data sets for describing central tendency and variability in data; statistical hypothesis testing and its application to group comparisons; issues of power and sample size in study designs; and random sample and other study types will be emphasized.

***Intended learning out comes:*** Upon successful completion of this course, the student will:

- 1. Knowledge and Understanding (student should)**
  - Understand the basic statistical concepts and their application to healthcare research.
  - Differentiate between parametric and nonparametric tests and comprehend their underlying assumptions.
  - Comprehend the conceptual basis of statistical inferences.
  - Decide what statistical technique will provide the best answer to a given research question.
  - Develop and understand the necessary computer skills using the SPSS in order to conduct basic statistical analyses.
- 2. Cognitive and Intellectual Skills.**
  - Discuss the practical importance of key concepts of probability, inference, systematic error, sampling error, measurement error, hypothesis testing, type I and type II errors, and confidence bounds.
  - Discuss the roles biostatistics serves in public health and biomedical research.
  - Discuss general principles of study design and its implications for valid inference.
  - Identify the importance of biostatistics in epidemiological clinical trials.
- 3. Subject Specific Skills**
  - Describe the role of the biostatisticians in biomedical research.
  - Assess data sources and data quality for the purpose of selecting appropriate data for specific research questions
  - Calculate standard normal scores and resulting probabilities.
  - Calculate and interpret confidence intervals for population means and proportions.
  - Interpret and explain a p-value
- 4. Transferable Skills.**
  - Translate research objectives into clear, testable statistical hypotheses.

## 5. Content

- Differentiate between quantitative problems that can be addressed with standard, commonly used statistical methods and those requiring input from a professional biostatistician

## 6. Critical Thinking

- Critically analyze and critique selected quantitative research reports and make judgment on the accuracy of the statistical techniques employed on those reports.
- Evaluate computer output containing statistical procedures and graphics and interpret it in a public health context
- Use SPSS package to perform two sample comparisons of means and create confidence intervals for the population mean differences
- Use SPSS package to compare proportions amongst two independent populations
- Use SPSS package to interpret output from the statistical software package related to the various estimation and hypothesis testing procedures covered in the course

## 7. Communication

- Uses media resources and information technologies to enhance knowledge base
- Apply numerical, tabular, and graphical descriptive techniques commonly used to characterize and summarize public health data

## 8. Integrity/Values

- Identify appropriate statistical methods to be applied in a given research setting, apply these methods, and acknowledge their limitations.

### Required Texts

Munro, B. (2012). *Statistical methods for health care research* (6<sup>th</sup> ed.). Philadelphia: Lippincott.  
 Kremelberg, D. (2011). *Practical Statistics: A quick and easy guide*. California: SAGE Publications, Inc.  
*Publication manual of the American Psychological Association*. (6<sup>th</sup> ed.). (2010). Washington, DC: American Psychological Association.

### Recommended Texts

Winner, L. (2004). *Introduction to Biostatistics*. Florida: Department of Statistics; University of Florida.  
 Daniel, W. (2005). *Biostatistics: A foundation for analysis in the health sciences*. New Jersey: John Wiley & Sons Inc.  
 Dunn, O., & Clark, V. (2001). *Basic statistics: A primer for the biomedical sciences* (3<sup>rd</sup> ed.). New York: John Wiley & Sons, Inc.  
 This text (*Basic statistics: A primer for the biomedical sciences* (3<sup>rd</sup> ed.); ISBN: 0-471-35422-8; 256 pages) is described in detail at the publisher's Web site: <http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471354228.html>.

Green, S., & Salkind, N. (2005). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (4<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson – Prentice Hall.  
 This text (*Using SPSS for Windows and Macintosh*; ISBN: 0-13-146597-X ; 480 pages) is described in detail at the publisher's Web site: <http://vig.prenhall.com/catalog/academic/product/0,1144,013146597X,00.html>

SPSS® Graduate Pack. Chicago, IL: SPSS, Inc.  
 This software program (SPSS® Graduate Pack) is described in detail at the publisher's Web site: <http://www.spss.com/gradpack/>.

Please note that *Microsoft Excel*, *Microsoft Internet Explorer*, *Microsoft Notepad*, *Microsoft Word*, and *SPSS Graduate Pack* are required for this class and that other software products are not supported.

### Learning-Teaching Strategies

This one-semester course will utilize EXTENSIVE interactive lectures, active discussions, worksheets, assignments, and individual and group efforts to attain the objectives. The use of whiteboard and markers for summarizing major points, audiovisual aids including overhead and slide projectors, handouts when required, online records, and the internet would be invested.

### ***Assignments, Evaluation, and Grading Scale***

The student's course grade will be primarily determined by a combination of midterm examination, class participation and attendance, in school, closed book, multiple choice style final examination. The final examination will incorporate principles and materials from the required readings and from classroom discussions and lectures.

### **Participation and Educational Guidelines:**

Each student must recognize that he/she bears the primary responsibility for his/her education. Classroom participation provides an opportunity to both refine your thinking and to practice expressing your ideas. Students are expected to prepare for lectures by reading the assigned materials and reviewing relevant materials. It is assumed that students will have read and thought about assigned materials before class. That is, you should at least have skimmed through them even if you don't understand them. Having documents for the session will be very helpful in following along with the material that is taught in the course. An internet access is highly encouraged.

Students are expected to attend all classes and ask questions as necessary. Successful learning in this course depends upon regular reading, studying, and class attendance. Absenteeism and missing sessions may hurt you significantly if you do not keep pacing with the course materials.

The discussions will be utilized in this course extensively. A constructive contribution helps to move the discussion forward. NONE will be penalized for floating an idea that others debunk. I encourage you to think critically, to challenge your classmates without showing disrespect, and to put forward your own ideas for consideration by others.

Students are encouraged to seek faculty assistance when they are having difficulty with content or with a specific skill. Seek help early. Don't wait until you are too deeply in trouble to bail yourself out. Office hours are listed above and I am also available only in appointments. Just because you can doesn't mean you should, invest your brain. Students are encouraged to talk with faculty on an individual basis if they want to explore specific content in more depth than is possible in class.

### **Exam Review Guidelines:**

Following each exam, a careful item analysis and critique will be conducted by the faculty for each exam question. This in-class exam review will be conducted during the first 10-15 minutes of the class day following receipt of the exam analysis. At this time, each item will be reviewed and the correct answer/rationale will be given. Any discussion or debate about exam questions will not be entertained during the review time. Students having further questions following the exam review may direct their question to the instructor at office hours or at a mutually agreed upon time.

### **General Course Policies:**

#### **Attendance Policy:**

Attendance is expected. Arrival on time is expected. Students who miss more than three class sessions with or without excuse will be dismissed from the course automatically. (See the university policies regarding absence).

#### **Cell Phone Policy:**

Cell phones should be turned off during class time. Disruption of class by ringing cell phones and cell phone conversations is inconsiderate of fellow students and faculty.

#### **Examination Policy:**

Students unable to take a scheduled exam are expected to inform the instructor within 3 days and make arrangements for a make-up one. Make ups will be given only to students who have notified the instructor and set up an alternate time. Any missed exam will result in a grade of zero for that particular examination type.

#### **Academic Integrity:**

Work submitted to the course instructor is assumed to be an expression of original ideas by the student. All students in this course are expected to adhere to university standards of academic integrity. Appropriate citation of the intellectual property of other authors is expected. Cheating, plagiarism, and other forms of academic dishonesty will neither be accepted nor tolerated. This includes, but is not limited to, consulting with another person during an exam, turning in written work that was prepared by someone other than you, and making minor modifications to the work of someone else and turning it in as your own. Ignorance will not be permitted as an excuse. If you are not sure whether something you plan to submit would be considered either cheating or plagiarism, it is your responsibility to ask for clarification.

#### **Communications:**

Contact by an email is highly encouraged and preferred.

Other than contacts by an email, contacts should take place during announced office hours and/or ONLY by appointment.

Contact on phones, preferably office number, also is welcomed during working hours. Please be informed that I have personal and/or institutional commitments those sometime inconvenient to others to whom I usually explain that. Therefore, when needed and based on your situation, you may call on my cell; however, when so, send your name in a separate message before to make your call in order accept your calls.

## Topics Tentative Schedule\*

Semester Lecture	Subject
First Lecture	Course Introduction and Overview Definition of Biostatistics
Second Lecture	Purposes of Biostatistics Population and Sample Types of Clinical Trials
Third Lecture	Scales of Measurement Descriptive Statistics: Measures of Central Tendency
Fourth Lecture	Descriptive Statistics: Measures of Variability & Relative Standing
Fifth Lecture	Graphical displays/looking at data Overview of SPSS
Sixth Lecture	Descriptive Statistics-Two Variables (Bivariate Description): Cross tabulation & Risk Indexes Fundamentals of Probability & Sampling Distributions
Seventh Lecture	Shapes of Distributions: Modality, Symmetry, Skewness, & Kurtosis
Eight Lecture	The Normal Distribution: Area Under the Normal Curve
Ninth Lecture	Introduction to Statistical Inference
Tenth Lecture	Inferences for Proportions Comparing Proportions: Relative Risk & Odds ratios
Eleventh Lecture	Estimations of Parameters Statistic inference Hypothesis testing Estimation Significance testing Statistical Tests as Decisions Power analyses
Twelfth Lecture	Parametric vs. Nonparametric Techniques
Thirteenth Lecture	Inferences about a Mean: One Sample t test (t), Two Sample t test (t) Analysis of Variance/ANOVA (F) Pearson's Product Moment Correlations (r).
Fourteenth Lecture	Categorical Data Analysis: Nominal Data: Chi-Square Goodness-of-Fit Test (Analysis of 2-way tables) & Chi-Square Test of Independence
Fifteenth Lecture	Nonparametric Statistical Tests: Ordinal Data: Mann Whitney U Test (U), Kruskal Wallis Test (H), Spearman's Rank Order Correlation Test

**Note:** The faculty reserves the right to make changes to this syllabus as required throughout the session to better meet the instructional needs of the class