Department of Epidemiology and Population Health

EPHD 310
Basic Biostatistics
[3 credits]

Course Syllabus
Fall Semester, Academic Year 2023-2024

Class time and Venue:
Lecture: Monday from 4:00 PM -5:40 PM in Van Dyck building, Auditorium

Labs:
B1: Tuesday from 1:30 PM -3:30 PM in room 103
B2: Wednesday from 10:00 AM -12:00 PM in room 203
B3: Thursday from 5:30 PM -7:30 PM in room 203

Course Instructors and Contact Details:
Dr. Miran Jaffa, Associate Professor of Biostatistics
Van Dyck Office 214
Extension: 4603
Email: ms148@aub.edu.lb
Office hours: by appointment or following the lecture/lab

Course Description:
This course is an introduction for graduate students to statistical techniques applied to health and biomedical related data. The objectives are twofold: *descriptive* and *inferential statistics*. This course will provide theoretical and applied foundation that are needed to: 1) Carry out statistical analyses appropriate for the data and the study design, 2) Deduce accurate inferences and conclusions that concern the study population, 3) Disseminate and interpret biostatistical results and conclusions in a proficient manner. At the end of this course students will be well rounded with the different analytical techniques that range from basic descriptive analysis, to mid-level analysis that distinguishes between different outcomes and applies the unadjusted tests suitable for the data under examination based on the study design and measurement scale, in addition to advanced modelling techniques using regression approaches linear, logistic and non-parametric methods.

Modes of Teaching
- **Lectures:** The instructor will explain using PowerPoint presentations new concepts each week. The students will have access to the presentations prior to the sessions, and they are required to bring hard copies to class so as they take notes. Lecture notes: Will be provided by the instructors via AUB Moodle

- **Labs:** Students will meet with the instructor in the computer lab to learn how to conduct statistical methodologies in order to analyze data using SPSS. Students will also apply the concepts covered in the lectures and practice what they have been taught that week by solving exercises with the instructor.

- **Midterms:** Three midterms will be given to evaluate the students' comprehension of the covered material.

- **Grading:** The course will be numerically graded over a total score of 100, and the final course grade will be a letter grade as per AUB regulations.

Course learning Objectives

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

LO1. Explain the role of quantitative methods and sciences of biostatistics in describing and assessing a population's health.

LO2. Apply the appropriate descriptive techniques commonly used to summarize public health data.

LO3. Describe commonly used statistical probability distributions and corresponding estimated parameters.

LO4. Analyze quantitative data using common statistical methods for inference through computer based statistical software and manual computation.

LO5. Apply alternative statistical methodologies to commonly used statistical methods when assumptions are not met.

LO6. Interpret results of statistical analyses found in public health studies and biomedical sciences.

LO7. Apply ethical principles to data management and analysis.

Council on Education for Public Health (CEPH) Core Competencies and Foundational Public Health Knowledge (FLOs) mapped to EPHD 310

- **FLO3.** Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health
- **CC3.** Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate
- **CC4.** Interpret results of data analysis for public health research, policy or practice

Essential Skills

- **Essential Skill 1:**
- **Essential Skill 2:**

Link to PHEO Faculty Portal

Course Learning Objectives mapped to CEPH competencies

__Table 1__. **Mapping of course LO to CEPH competencies**

	LO1	LO2	LO3	LO4	LO5	LO6	LO7
FLO3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health	X						X
CC3. Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate		X	X	X	X		X
CC4. Interpret results of data analysis for public health research, policy or practice (addressed in						X	

Assigned Text Book and Readings (if applicable)

Required readings:
- Biostatistics; Wayne W. Daniel; 9th or 10th ed.
- Fundamentals of Biostatistics; Bernard Rosner; 5th ed.

Additional Suggested Instructions:

The course will also use an assortment of educational resources including: publications, reports, white papers, videos and case studies. All course readings, except for book chapters, will be posted on Moodle according to the weekly topic and reading schedule. It is the responsibility of students to access the Moodle and download/ print the course readings as per the weekly schedule.

Course requirements and Student evaluation:

Pre-requisites: There are no pre-requisites for this course.

Student Evaluation:

Table-2 Summary of students' assessments mapped to course learning objectives

	Learning Objectives						
	LO1	LO2	LO3	LO4	LO5	LO6	LO7
Midterm 1	X	X	X	X			X
Midterm 2				X	X	X	
Assignment 1	X	X					
Assignment 2			X	X			
Assignment 3				X	X		X

Table -3 Description of Assessment methods, Due Dates and Corresponding Learning Objectives

Assessment method	Date (tentative)	Grade percentage
Midterm 1	*[Insert Date]*	*45%*
Midterm 1 covers Lectures 1a, 1b 2,3 a, 3b, 4,5		
Midterm 2	*[Insert Date]*	*45%*
Midterm 2 covers Lectures 6, 7a, 7b, 8a, 8b,9 +overall cumulative questions on lectures 1 to 5, date will be set by the Registrar's office		
Assignment 1	*[Insert Date]*	*3.33%*
Covers Lecture 1a and 1b		
Assignment 2	*[Insert Date]*	*3.33%*
Lecture 2, 3a, 3b, 4, 5		
Assignment 3	*[Insert Date]*	*3.33%*
Lecture 6, 7a, 7b		

AMERICAN UNIVERSITY OF BEIRUT
FACULTY OF HEALTH SCIENCES

Policies and other General Notes:

Academic Integrity/Dishonesty:
Copying and sharing lectures with others is totally forbidden. Copies can be made just for your personal use. Lectures and course material are the property of the professor and cannot be shared with others.
Sharing of Midterms with others is forbidden and falls under cheating and will have repercussions as per the code of conducts for students.
Cheating and plagiarism will not be tolerated. Review the Student Code of Conduct in your handbook and familiarize yourself with definitions and penalties. If you're in doubt about what constitutes plagiarism, ask your instructor because it is your responsibility to know. The American University of Beirut has a strict anti-cheating policy. Penalties include failing marks on the assignment in question, suspension or expulsion from University and a permanent mention of the disciplinary action in the student's records.

Class Rules and Regulations:
▪ Attendance is encouraged and students are encouraged to be available on time to attend the common lectures and training sessions/Labs.
▪ Students are expected to attend the section in which they are enrolled in.
▪ In class participation is encouraged.
▪ Questions and clarifications related to the covered material are always welcomed.

Special Needs:
AUB strives to make learning experiences as accessible as possible. If you anticipate or experience academic barriers due to a disability (including mental health, chronic or temporary medical conditions), please inform me immediately so that we can privately discuss options. In order to help establish reasonable accommodations and facilitate a smooth accommodations process, you are encouraged to contact the Accessible Education Office: accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314.

Non-Discrimination-Title IX-AUB:
AUB is committed to facilitating a campus free of all forms of discrimination including sex/gender-based harassment prohibited by Title IX. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix. To report an incident, contact the University's Title IX Coordinator Trudi Hodges at 01-350000 ext. 2514, or titleix@aub.edu.lb. An anonymous report may be submitted online via EthicsPoint at www.aub.ethicspoint.com.

Public Health Education Office (PHEO):
PHEO is established for the Faculty and Student portals as hubs for important information. PHEO can be accessed on the following link:
https://sites.aub.edu.lb/fhspheo/news/

Accessible Education Office (AEO):

The Accessible Education Office (AEO) coordinates academic accommodations and services for all eligible AUB students with disabilities (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions, and others). If you have a disability for which you wish to request accommodations at the department, faculty or university level, please contact AEO as soon as possible. Once you register with our office, we will assist you in receiving appropriate accommodations and will liaise with your instructors and any related entity to best support your needs. AEO is located in West Hall room 314, and can be reached by phone at 1-350000 ext. 3246 or by email: accessibility@aub.edu.lb. Information about our services can be found at: https://www.aub.edu.lb/SAO/Pages/Accessible-Education.aspx

Writing:

Written communication is essential for communication, health education and behavioral science. You are expected to proofread and spell-check any written documents before submission. Points will be deducted from the grades for low quality writings. You are encouraged to contact AUB's Writing Center, located in Ada Dodge Hall, 2nd floor or West Hall, 3rd floor. Appointments can be booked online: https://aub.mywconline.com/ over the phone (Ext. 4077) or by walking in.
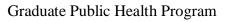
Public Health Education Office

Please refer to the Public Health Education Office Student Portal

Detailed course outline:

Week	Title and Dates of Lecture/ Practical Sessions	Topic	Relevant Assignment (where your learning on this will be assessed)	Course learning objective LO covered in the lecture
Week 1 and Week 2	**Lectures: Introductory Lecture: Introduction to Biostatistics and Biostatistics notations. Lectures 1a, 1b: Descriptive analysis and summary statistics. Weeks of Aug 30 and Sep 6**	Introduction to biostatistics, role of biostatistics in public health and biomedical field. Basic definitions in biostatistics such as predictors, outcomes, population, sample, random sample, inferences, variables, random variables, and types of variables. Discussion of the methods for summarizing and describing data numerically and graphically: mean, median mode, variance, percentiles, frequency tables, graphs and charts, percent and valid percent. Lab Application on SPSS and by hand.	Midterm 1 Assignment 1	*LO 1, 2* *LO 1, 2*
Week 3	**Lecture 2: Introduction to most common continuous probability distributions: Normal, Standard Normal and Student's t distributions. Week of Sep 13**	Normal distribution, Standard normal distribution, Student's t distribution and the corresponding percentiles using the tables for the standard normal and the t distributions.	Midterm 1 Assignment 2	*LO 3* *LO 3*
Week 4 and Week 5	**Lecture 3a: Estimation Lecture 3b: Hypothesis testing and paired t test for two dependent groups. Weeks of Sep 20 and Sep 27**	3a: Point and Confidence interval estimation of the population mean of normally distributed data. Hypothesis testing of the population mean of	Midterm 1 Assignment 2 Midterm 1 Assignment 2	*LO 3* *LO 3* *LO 4* *LO 4*

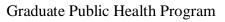| Week	Title and Dates of Lecture/ Practical Sessions	Topic	Relevant Assignment (where your learning on this will be assessed)	Course learning objective LO covered in the lecture
		normally distributed data using CI method. 3b: Introduction to hypothesis testing: critical, P-value and confidence interval methods. Matched study design and follow-up study design and hypothesis testing/inferences for two		

Appendix I. Reinforced – Introduced CEPH competencies

Introduced competencies: the competency is introduced at a basic level. Instruction and learning activities focus on basic knowledge, skills and entry-level complexity. The competency is **not assessed**

Reinforced competency: The competency is reinforced with feedback; students demonstrate the outcome at an increasing level of proficiency (above the introductory stage). Instruction and learning activities concentrate on enhancing and strengthening existing knowledge and skills, as well as expanding complexity. The competency is **not assessed**

Core Competencies	Introduced	Reinforced
CC1. Apply epidemiological methods to the breadth of settings and situations in public health practice		
CC2. Select quantitative and qualitative data collection methods appropriate for a given public health context		
CC3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate		
CC4. Interpret results of data analysis for public health research, policy or practice		
CC5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings		
CC6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels		
CC7. Assess population needs, assets and capacities that affect communities' health		
CC8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs		
CC9. Design a population-based policy, program, project or intervention		
CC10. Explain basic principles and tools of budget and resource management		
CC11. Select methods to evaluate public health program		
CC12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence		
CC13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes		
CC14. Advocate for political, social or economic policies and programs that will improve health in diverse populations		
CC15. Evaluate policies for their impact on public health and health equity		
CC16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making		
CC17. Apply negotiation and mediation skills to address organizational or community challenges		
CC18. Select communication strategies for different audiences and sector		
CC19. Communicate audience-appropriate public health content, both in writing and through oral presentation		
CC20. Describe the importance of cultural competence in communicating public health content		
CC21. Integrate perspectives from other sectors and/or professions to promote and advance population health		

	Introduced	Reinforced
CC22. Apply systems thinking tools to a public health issue		

HPCH competencies	Introduced	Reinforced
HPCHCC1. Demonstrate a critical understanding of multidisciplinary theories/frameworks utilized in health promotion research and practice		
HPCHCC2. Employ theoretical knowledge and methodological skills in health promotion program planning, implementation, monitoring, and evaluation		
HPCHCC3. Conduct rigorous quantitative and qualitative research for health promotion		
HPCHCC4. Use participatory approaches in community health programs and research		
HPCHCC5. Promote social justice and equity in health promotion research, practice, and policy		

HMPD competencies	Introduced	Reinforced
HMPCC1: Assess how the structure, organization, delivery, and financing of health care systems affect system performance in terms of efficiency, quality, equity, and effectiveness		
HMPCC2: Apply systems thinking approaches to improve healthcare organizations' performance and responsiveness		
HMPCC3: Apply quality tools and concepts to evaluate and improve performance in health care organizations		
HMPCC4: Apply the principles of planning, budgeting, management and evaluation in healthcare related programs and projects		
HMPCC5: Analyze relevant financial data for efficient management of healthcare programs and organizations		
HMPCC6: Utilize health information systems and data analytics to support evidence-based decision making at the organizational and system levels		
HMPCC7: Apply public policy principles, frameworks and tools to understand health problems and priorities		
HMPCC8: Evaluate policy options to address health challenges including economic, legal and political implications		
HMPCC9: Utilize knowledge translation strategies and tools to communicate effectively and influence health policy and system decision making		

EPHD competencies	Introduced	Reinforced
EBCC1: Discuss the extent, distribution and determinants of common and emerging communicable and non-communicable diseases, and mental health disorders of local, regional and global importance		
EBCC2: Discuss prevention and control strategies/programs for common and emerging communicable and non-communicable diseases and mental health disorders		
EBCC3: Design epidemiological studies to investigate public health research questions		
EBCC4: Demonstrate ability to write software codes in order to manage and analyze health data through the use of multiple statistical software		
EBCC5: Apply inferential statistics and advanced statistical approaches such as regression modelling to analyze complex health related data		
EBCC6: Interpret and communicate statistical findings in oral and written format		

EBCC7: Review, synthesize and communicate published epidemiological findings in oral and written format		
EBCC8: Appraise the quality of epidemiological evidence by evaluating studies for bias and other sources of systematic errors		
EBCC9: Analyze Health related data using advanced statistical techniques and software packages		