Department of Epidemiology and Population Health

Faculty of Health Sciences

**Epidemiology Beyond the Basic-Blended**

**EPDH 320 (2 credits)**

Course Syllabus

Spring AY 2023-2024

# **Course Instructor**

Dr Monique Chaaya, Dr. PH. (Johns Hopkins University); MPH (Epidemiology & Biostatistics) & B.Sc. Environmental health (American University of Beirut)

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Office hours: By appointment

Course schedule: Tuesday (Lecture): 9:00-10:15 am, room 103

Thursday (Practical: Lab/discussion): 9:00 - 10:59 am, room 103

# **Course Description**

The course provides advanced knowledge of epidemiologic studies and covers in details methodological issues concerning the design and the analysis of observational studies (cross sectional, case control and cohort studies). It also introduces design and analysis of randomized controlled clinical trials. The course addresses key validity issues related to selection of study subjects, accuracy of measures, confounding bias, and discusses effect modification. The course relies on didactic teaching, applications and class discussion of selected articles, and Moodle discussion. Ethical considerations in epidemiologic research are discussed throughout the course.

# **Specific learning objectives**

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

1. Apply epidemiological principles and methods to design epidemiological studies.
2. Apply various epidemiological measures of disease occurrence and association for different study designs.
3. Evaluate association based on causal and statistical inference.
4. Distinguish between confounding and effect modification and apply these concepts to describe the role of variables as potential confounders or effect modifiers.
5. Interpret and summarize results of advanced statistical analyses of epidemiological data.
6. Apply STROBE guidelines to evaluate the reporting of observational epidemiological studies.
7. Appraise the quality and validity of epidemiological studies.
8. Apply ethical principles in all stages of epidemiological research.

**ESSENTIAL SKILLS**

* **Essential Skill 1:** Critical thinking
* **Essential Skill 2:** Problem solving
* **Essential Skill 3:** Presentation skills

**Link to** [**PHEO Faculty Portal**](https://sites.aub.edu.lb/fhspheo/coursedevelop/)

# **Concentration Competencies**

[EBC3]: Design epidemiological studies to investigate public health research questions.

[EBC5]: Apply inferential statistics and advanced statistical approaches such as regression modelling to analyze complex health related data.

[EBC6]: Interpret and communicate statistical findings in oral and written format.

[EBC8]: Appraise the quality of epidemiological evidence by evaluating studies for bias and other sources of systematic errors.

Prerequisites: EPHD 300 and EPHD 310

# **Structure of the Course**

The course is in blended format with in-person sessions, and around 30 % of online asynchronous sessions /activities. Students meet in person, at least once a week with the instructor. During asynchronous sessions, students do not attend class but are responsible for performing specific tasks that will meet the objectives of the course. Different ways of assessment will be used (design of one study, article-based presentation, participation, and an in class exam). Some of the assessments are done in group.

# **Recommended Textbooks**

A big part of this course is based on the book “**Epidemiology Beyond the Basics**” by Szklo and Nieto, 4th edition, Jones and Bartlett, 2019. Selected book chapters and other mandatory readings are indicated in the class schedule. **An e book will be available at a cost of 44.59 $.**

Other textbooks used:

* “The Case-Control Method Design and Applications” by Haroutune Armenian, Oxford 2009
* Epidemiology: “Concepts and Methods” by Oleckno, Waveland Press 2008

# **Policies and other General Notes**

**Academic integrity:**

Education is demanding and you need to properly manage your time. Do not hesitate to use the resources around you but do not cut corners. Cheating and plagiarism will not be tolerated. Review the Student Code of Conduct and familiarize yourself with definitions and penalties. Cheating might earn you a failing mark on the assignment, at the very least. You might fail the course in which you cheated, be warned, suspended or expelled from university and a permanent mention of the disciplinary action might be made in your student records. If you’re in doubt about what constitutes plagiarism, ask your instructor because it is your responsibility to know. Remember that the American University of Beirut has a strict anti-cheating and anti-plagiarism policy. Do not become a lesson to others. For further information, kindly visit AUB’s Policies and Procedures or

<http://pnp.aub.edu.lb/general/conductcode.>

Students are to honor AUB’s Code of Conduct and Academic Integrity. In that, students are expected to be mindful of issues of copyright infringement and plagiarism.

Since there is no guiding statement from AUB on use of AI tools, such as ChatGpt, Bard, Grammarly, and others, it is important for you to know the stance of the course instructors. In EPHD 320 you will be asked to use an AI tool to generate content for one assignment on designing a cross sectional study. Instructions will be given in class. For other assignments you can use AI tools to generate content (text, video, audio, images) to **support you in preparing** one of the assignments but cannot ask AI to do your assignment. If you use AI, you need to be transparent about it. Please note that AI tools may generate inaccurate information and citations. Students will be held accountable for any false products they submit.

**Students with Disabilities:**

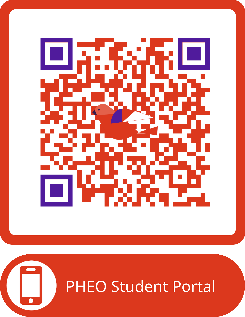
Staff members of the AUB Office of Student Affairs, Room 113, West Hall, coordinate accommodations and services for students with special needs. If you have a disability, for which you may request accommodation in AUB classes, consult the website for more information and make arrangements with the coordinator. (http://www.aub.edu.lb/sao/Pages/Students\_20with\_20Special\_20Needs.aspx). Also, please see the instructor of this course privately in regard to possible support services that can be provided to you.

**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](https://www.aub.edu.lb/titleix). To report an incident, contact the University's DEI (Diversity, Equity and Inclusion) and Title IX Coordinator Mitra Tauk at 01-350000 ext. 2514, or [titleix@aub.edu.lb](mailto:titleix@aub.edu.lb). An anonymous report may be submitted online via EthicsPoint at [www.aub.ethicspoint.com](https://www.aub.ethicspoint.com/).

**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 accommodation 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 accommodation 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](mailto: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

**Netiquette**

Netiquette refers to the proper way to communicate electronically with others. You can take a short quiz online to make sure you are practicing a good Netiquette. Be aware of the possibility of miscommunication and compose your comments in a positive, supportive, and constructive manner by following the tips below:

* Use non-offensive language.
* Use correct spelling and grammar in all written communications. Always proofread.
* Avoid using all caps.
* Avoid unnecessary symbols, abbreviated words, texting shorthand, and replacing words with numbers.
* Keep an “open mind” and be willing to express even your minority opinion.
* Respect other people’s time and bandwidth.
* Respect other people’s privacy. Think before you push the “Send” button.
* Do not hesitate to ask for feedback.

References and Readings

(This is not an exhaustive list of readings)

1. Erik Von Elm ,Douglas G Altman, Matthias Egger, Stuart J Pocock, Peter C Gøtzsche, Jan P Vandenbroucke, for the strobe initiative. 2007. The strengthening the reporting of observational studies in epidemiology (strobe) statement: guidelines for reporting observational studies. PLOS Medicine. <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0040296>
2. Haroutune Armenian. 2009. Avoiding bias in case control selection, Chapter 3. In (ed Armenian) The Case-Control Method: Design and Applications. Oxford University Press
3. Gayane Yenokyan. 2009. Analysis of case control data, Chapter 6. In (ed Armenian) The Case-Control Method: Design and Applications. Oxford University Press
4. Haroutune Armenian. 2009. Applications: Outbreak investigation, Chapter 7. In (ed Armenian) The Case-Control Method: Design and Applications. Oxford University Press
5. David A Grimes, Kenneth F Schulz. 2005. Compared to what? Findings controls for case-control studies. Lancet, 365, 1429-33
6. [Michael N. Bates](javascript:;) [Omar A. Rey](javascript:;) [Mary L. Biggs](javascript:;) [Claudia Hopenhayn](javascript:;) [Lee E. MooreDavid Kalman](javascript:;) [Craig Steinmaus](javascript:;) [Allan H. Smith](javascript:;). 2004. Case-Control Study of Bladder Cancer and Exposure to Arsenic in Argentina. American Journal of Epidemiology, Volume 159, Issue 4, 15 February 2004, Pages 381–389,<https://doi.org/10.1093/aje/kwh054>
7. Al-Shaar, L., **Chaaya$, M.**, Ghosn, N., Mahfoud, Z. (2014). Brucellosis Outbreak in Chouf district-Lebanon, 2009: A case control study. Eastern Mediterranean Health Journal, 20(4), 250-6.
8. Nguyen CL, Nguyen PTH, Chu TK*, et al.* 2017. Cohort profile: maternal lifestyle and diet in relation to pregnancy, postpartum and infant health outcomes in Vietnam: A multicentre prospective cohort study. *BMJ Open; 7:e016794*. doi: 10.1136/bmjopen-2017-016794
9. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies <https://www.equator-network.org/reporting-guidelines/strobe/>
10. Rothman K. J. (2014). Six persistent research misconceptions. *Journal of general internal medicine*, *29*(7), 1060–1064. https://doi.org/10.1007/s11606-013-2755-z
11. More articles/book chapters will be added to the list

Table 1: Learning Objectives mapped to concentration competencies.

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|  | **Learning Objectives** | | | | | | |  |
| **Concentration Competencies** | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** | **LO6** | **LO7** | **LO8** |
| [EBC3]: Design epidemiological studies to investigate public health research questions | X |  |  |  |  | X |  | X |
| [EBC5]: Apply inferential statistics and advanced statistical approaches such as regression modelling to analyze complex health related data |  | X | X | X |  |  |  |  |
| [EBC6]: Interpret and communicate statistical findings in oral and written format |  |  |  | X | X |  |  |  |
| [EBC8]: Appraise the quality of epidemiological evidence by evaluating studies for bias and other sources of systematic errors |  |  |  |  |  | X | X |  |

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| Assessment | Group/Individual work | Percentage | Course Learning Objectives | Distinct Competencies | Deadline of submission |
| 1. Designing a cross sectional study: | Group (3students) | 15% | LO1, LO2, LO6, LO8 | EBC3 | March 7 |
| 1. Designing a case control study | Group (3 students) | 15 % | LO1, LO2, LO6, LO8 | EBC3 | March 30 |
| 1. Homework on survival analysis | Individual | 5% | LO2, LO5 | EBC5 | April 15 |
| 1. Presentation of a critical evaluation of two articles | Group (3 students) | 10 % | LO6, LO7, LO8 | EBC8 | April 18 |
| 1. In class final exam | Individual | 40% | LO2, LO3,LO4, LO5, LO7, | EBC5, EBC6, EBC8 | TBA |
| 1. Participation in applications and discussion in class (each ~ activity 2.5 %) | Individual | 15 % | LO1, LO3, LO4, LO5, LO7, LO8 | EBC3, EBC6, EBC8 | Dates on submission of small exercises on forum discussion are indicated in the schedule |

Table 2: Table Assessment (type and weight) mapped to course learning objectives (LOs) and Concentration competencies.

Table 3: Description of Assessment methods, type, Corresponding Learning Objectives and grade percentage

| **Assessment method** | **Group / Individual work** | **LOs covered** | | **Grade percentage** |
| --- | --- | --- | --- | --- |
| **Assessment 1 and 2: Design of an epidemiological study 15 % each** | **Group** | **LO1, LO2, LO6, LO8** | | **30%** |
| The purpose of these activities is to apply epidemiological principles and methods discussed in class to **design one cross sectional study and one case control study** to answera specific research question that the instructor specifies. Students, in groups, will design the study where they have to address thoroughly and critically all aspects of design and analysis, discuss strength and associations of their design, and highlight ethical issues relevant to the study. The final product is evaluated based on rubrics shared a priori with students on Moodle | | | | |
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| **Assessment 3: Homework on survival analysis** | **Individual** | | **LO2, LO5** | **5%** |
| This homework assignment involves statistical analysis using real datasets generated from a cohort study with time to event data. Students analyze the data using different approaches but most importantly time to event analysis, specifically survival analysis using Kaplan Meier curve and Cox regression analysis. Students will present their results and interpret their findings. SPSS/STATA outputs should be provided | | | | |
| **Assessment 3: Presentation critical evaluation of two articles** | **Group** | **LO6, LO7, LO8** | | **10 %** |
| Students in group will evaluate the internal validity of assigned articles and will present their results orally. Instructor and students will evaluate the presentation in terms of content and thoroughness of evaluation and in terms of quality of the presentation. | | | | |
| **Assessment 5: in class final exam** | **Individual** | **LO2, LO3 LO4, LO5, LO7** | | **40 %** |
| This assessment is intended to provide an individual student assessment of the level of apprehension of the material covered in last 6 weeks. The quiz consists of MCQs and open ended questions. It will cover two major designs (cohort and experimental), and a problem on survival analysis where they have to apply epidemiological methods (calculation of appropriate measures of association, stratifying data, etc. | | | | |
| **Assessment 6: Participation** | **Individual** | **LO1, LO5, LO3, LO4, LO7** | | **15 %** |
| Studentsare required to complete assigned readings prior to class to allow engaged participation in class. They will also be asked to comment on specific parts of a published epidemiological study and engage in an online discussion on Moodle Forum and do applications in class and they have to respond to specific questions raised by the instructor. | | | | |

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| Tuesday Dates | Lecture session content | Thursday Dates | Application session content | Assigned readings + comments |
| January 23, 2024 | Introduction to EPHD 320 | January 25, 2024 | * Reviewing measures of occurrence * NNT * Hazard rate * More from Nieto | Szklo and Nieto  Chap 2  VOP Chaaya |
| January 30, 2024 | * Reviewing measures of disease association * Evaluating Associations * Statistical evaluation | February 1, 2024 | * Applications in class | Szklo and Nieto  Chap 3  VOP Chaaya |
| February 6, 2024 | * Evaluating measures of associations: Confounding   By Dr. Christelle Akl | February 8, 2024 | * No class/ Application on Moodle   Submission of exercise on Monday February 12 noon | Szklo and Nieto chap 5 |
| February 13, 2024 | * Assessing heterogeneity of effects: interaction /effect modification | February 15, 2024 | * Applications on Interaction / effect modification 2.5 % | Szklo and Nieto Chap 6 |
| February 20, 2024 | Flipped classroom   * Cross-sectional studies: issues of design * Focusing on sampling (including sample size) and measurement including questionnaire design * Introduce guidelines | February 22, 2024 | Application: critical assessment of two cross-sectional studies using STROBE and other guidelines (online) | Critical assessment of two published papers conducted in class. TBL (2.5 %) |
| February 27, 2  024 | Case-control studies: Issues of design   * Selection, sources and types of cases and controls, sample size, and biases | February 29, 2024 | * Discussion of a published case-control study | Armenian’s chapter 3 + Assigned article on cancer |
| March 5, 2024 | * Case-control studies: Issues of analysis * Discussion of results from a published article | March 7, 2024 | No Class: Finalizing and Submitting the cross sectional design paper | Armenian’s chapter 6  Deadline for assessment March 9 |
| March 12, 2024 | * Discussion of 2 published case-control studies * Discussion of case control design, informal presentation | March 14, 2024 | Discussing first assignment and working on the case control design assignment | Submission of the case control design March 30 |
| March 19, 2024 | Cohort studies: Issues of Design   * Supporting articles on Moodle | March 21, 2024 | Article discussion | Oleckno, Chapter 11+  Assigned article on a cohort of pregnant women |
| March 26, 2024 | Experimental studies: Session I | March 28, 2024 | Experimental studies: Session II | (Guest lecturer: Dr. Khalil El Asmar) VOP |
| April 2, 2024 | Experimental Design: Forum discussion | April 4, 2024 | Lecture on survival analysis | Hands on application in the computer lab using STATA/ SPSS |
| April 9, 2024 | Survival Analysis: Application in computer lab | April 11, 2024 | Holiday - No class  (Id Al Fitr) | Survival analysis assignment Submission April 15 |
| April 16, 2024 | Biases by Christelle Akl  Appraise the quality of epidemiological studies | April 18, 2024 | Presentation of critique of assigned papers |  |
| April 23, 2024 | Possibility of attending sampling of Raphael | April 25, 2024 | Possibility of attending sampling of Raphael |  |

**Appendix I. Reinforced – Introduced CEPH competencies**

Introduced competencies: 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.**

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| **Core Competencies** | **Introduced** | **Reinforced** |
| CC3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate |  | X |
| CC4. Interpret results of data analysis for public health research, policy or practice |  | X |

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| **EPHD competencies** | **Introduced** | **Reinforced** |
| EBCC7: Review, synthesize and communicate published epidemiological findings in oral and written format |  | X |

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