EPI/ENVH 573
Methods and Issues in Using Biological Measurements in Epidemiologic Research

Autumn 2017
Health Sciences Center Room T-478
Mondays and Wednesdays, 10:30 – 11:50

Instructor: Stephen M. Schwartz, Ph.D. (Professor, Department of Epidemiology)

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Course website: https://canvas.uw.edu/

Office Hours: By appointment at the FHCRC or UW

Prerequisites: EPI 511 or EPI 512, or by permission of instructor. Students who are permitted to enroll in the course without the prerequisite coursework are still responsible for knowing the material covered in those courses.

Purpose of Course: Human studies of disease etiology and prognosis often require the measurement of one or more characteristics of biological material. The purpose of this course is to provide students with an introduction to the methods and issues arising in the design, conduct, and analysis of these studies. Specifically, by the end of this course, a student should be able to:

• identify strengths and limitations of using biological measures in human studies of disease etiology, and the characteristics of biomarkers that should be established prior to incorporating them into epidemiologic studies;

• identify the goals of, and strategies in conducting, discovery and characterization studies of biomarkers;

• identify potential sources and impact of biomarker measurement error, in particular the role of differential and nondifferential misclassification of binary and continuous biomarkers;

• identify strengths and limitations of various traditional epidemiologic study designs, and implementation strategies, for the purposes of incorporating biomarker measurements;

• critique scientific reports from human populations that involve biologic measures in the study of disease etiology, prognosis, and early detection.

1 Except on December 12th, when class will meet from 8:30 – 10:20 am
Format:

There are 20 sessions. Eighteen sessions will consist of lectures on methodologic issues, applications of methodologic issues to particular diseases, discussion of homework assignments, discussion of research papers, discussion of real or hypothetical case studies, or a combination of these. All readings can be downloaded and printed from the course website. Two sessions are reserved for student presentations of final papers.

Evaluation:

EPI/ENVH573 is a 3 credit, graded course. The grade will be based on class attendance and participation in discussions (10%), three assignments (contributing 20% each), and a final paper and presentation (30%). The assignments and paper are described generally below.

Assignments: Assignments will be distributed throughout the quarter (see attached course schedule.), and will involve written exposition of ideas, interpretation of data and/or calculations, etc. Some may involve data analyses (including multivariate methods) for which access to a basic statistical package (e.g., SAS, SPSS, STATA) will be necessary. STATA is preferred. We will discuss each assignment in class on the date indicated in the syllabus (unless otherwise changed).

Paper: Each student will write a brief paper summarizing the use of a biomarker (or family of related biomarkers) in studies of human disease. More information on this assignment will be provided in a separate handout. During the final two class sessions, each student will present a brief (9-12 minutes depending on the number of students) presentation summarizing his or her paper.

All assignments and papers must be prepared electronically using MS-Word or compatible software (not PDF) and uploaded to the UW Canvas Learning Management System (https://canvas.uw.edu/) by the due date and time.

Points for late assignments in the absence of a reasonable excuse (e.g., illness) will be 5-10% lower than for assignments submitted on time. Assignments will not be accepted after discussion of the answers in class, or after 10:30 am on the 7th day after the due date regardless of when the discussion occurs.

There is no final examination. However, we will meet during the official UW final examination scheduled time (Monday, December 11th, from 8:30 – 10:20 am) as part of the student presentations.

Multi-cultural inclusion commitment:

The UW School of Public Health (SPH) seeks to ensure all students are fully included in each course. We strive to create an environment that reflects community and mutual caring. We encourage students with concerns about classroom climate to talk to your instructor, your advisor, a member of the departmental or SPH Diversity Committee and/or the program director. DCinfo@uw.edu is a resource for students with classroom climate concerns.
Texts on Reserve


Rebbeck TR, Ambrosone CB, Shields PG. Molecular Epidemiology: Applications in Cancer and Other Human Diseases. Informa Healthcare, New York, 2008


Academic Integrity

Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity.

The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). You are expected to know and follow the university’s policies on cheating and plagiarism, and the SPH Academic Integrity Policy (http://sph.washington.edu/students/academicintegrity/). Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct website (http://www.washington.edu/cssc/student-conduct-overview/student-code-of-conduct/).

Accommodations

If you would like to request academic accommodations due to a disability, please contact Disabled Student Services, 448 Schmitz, 543-8924 (V/TTD). If you have a letter from Disabled Student Services indicating you have a disability that requires academic accommodations, please present the letter to the instructor so that he can discuss the accommodations you might need for the class.
## Session Schedule

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<tr>
<th>Session</th>
<th>Topic</th>
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| Wed 9/27 | Introduction to Course  
Introduction to Biomarkers in Epidemiologic Research | Schwartz |
| Mon 10/2 | Article Discussion                                                   | Schwartz |
| Wed 10/4 | Validity and Reliability Studies for Biological Markers  
Begin Assignment #1 | Schwartz |
| Mon 10/9 | Validity and Reliability Studies for Biological Markers (continued)  
Assignment #1 Due and Discussed | Schwartz |
| Wed 10/11 | Biomarker Discovery and Characterization                              | Schwartz |
| Mon 10/16 | Tissues, Assays, and Laboratory Variation                            | Schwartz |
| Wed 10/18 | Study Design and Implementation                                      | Schwartz |
| Mon 10/23 | Study Design and Implementation (continued)                          | Schwartz |
| Wed 10/25 | Statistical Analysis of Biomarker Data                               | Kerr     |
| Mon 10/30 | Application: Chronic Inflammation in Adipose Tissue                  | Kratz    |
| Wed 11/1  | Application: Nutrition                                               | Neuhouser|
| Mon 11/6 | Application: Vaginal Microbiome                                      | Balkus   |
| Wed 11/8 | Application: Nephrology                                              | Kestenbaum|
| Mon 11/13 | Application: Human Papillomavirus                                    | Winer    |
| Wed 11/15 | Homework #2 Discussion                                               | Schwartz |
| Mon 11/20 | Application: Air Pollution                                            | Simpson  |
| Wed 11/22 | Application: Cancer                                                  | Whiteaker|
| Mon 11/27 | Homework #3 Discussion                                               | Schwartz |
| Wed 11/29 | Application: HIV Phylogeny                                            | Herbeck  |
| Mon 12/4  | Application: Malaria                                                 | Murphy   |
| Wed 12/6  | Student Presentations                                                | All      |
| Mon 12/11* | Student Presentations                                               | All      |

* This session will take place from 8:30 – 10:20 am. Final papers will be due on this date at 5 pm.