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WARF 703  
(608) 265-6176

Course Description: Epidemiologic Methods 4 (PHS 805) is directed to PhD and MSc students. This course expands on the knowledge and abilities developed in PHS797 and PHS798. The goal of PHS 805 is to provide students with an opportunity to learn about the rationale and use of study designs that built upon but are substantially different from the most common designs used in epidemiologic research (experimental studies, case-control studies, and cohort studies). The main emphasis of PHS 805 is on the understanding and use of viewpoints and design/analytical tools to improve the estimation of causal effects in epidemiologic studies. Student evaluation will be based on the development, presentation, and discussion of an individual course project involving the use of principles and tools discussed in the course.

Course Objectives: By the end the course the student will be able to:
   a) Demonstrate a good understanding of the main features of the counterfactual model as a base for causal inferences in epidemiological research.
   b) Identify assumptions needed for causal inference and assess whether they are sufficient to allow the estimation of causal effects from available data.
   c) Understand and use design and analytic strategies that help in the estimation of causal effects.

Credits: 3

Grading: Student evaluation will be based on the development, presentation, and discussion of an individual course project. The project must make substantial use of the principles and design/analytic strategies learned in the course. Grades will be assigned as 90.0-100, A; 85.0-89.9, AB; 80.0-84.4, B; 75.0-79.9, BC; 70.0-74.9, C; etc.

Policies: - Course readings should be completed prior to the start of the corresponding lecture.
    - Students are encouraged to discuss course contents with each other.
    - Students should expect to be individually asked to participate in the class discussions
    - Hand outs and homework assignments will be delivered through learn@uw.

Online access: Desire to learn (D2L) at: https://learnuw.wisc.edu/
**Course schedule:** Tuesday & Thursday 1:00 to 2:15 p.m., WARF 758

**Course Topics and Readings:**

About 12 topics will be covered in 15 weeks. Some topics may require more than two class periods to complete, but this additional time is built into the schedule.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>- Sept 2-4</td>
<td>Causalitity: The Counterfactual framework</td>
<td>L Bautista</td>
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<td>- Sept 09-11</td>
<td>Mendelian randomization</td>
<td>P Peppard</td>
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<td>- Sept 16-18</td>
<td>Causalitity: Causal diagrams</td>
<td>Peter Steiner</td>
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<td>- Sept 23-25</td>
<td>Case-crossover studies</td>
<td>L Bautista</td>
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- **Sep32-Oct 2 Multivariate matching methods**
  Readings:  

- **Oct 07-09 Ecologic studies**
  Readings:  
  - Pearce N. The ecological fallacy strikes back. *J Epidemiol Community Health* 2000; 54 :326–327

- **Oct 14-16 Meta-analysis**
  Readings:  

- **Oct 21-23 Sensitivity analysis in epidemiological studies**
  Readings:  

- **Oct 28-30 Mediation analysis**
  Readings:  
  - Albert, JM. Mediation analysis via potential outcomes

- **Nov 4-6**  **Missing Data Analysis**  

- **Nov 11-13**  **Bayesian Methods on Epidemiology**  

- **Nov 18-20**  **Spatial Epidemiology**  

- **Nov 26-28**  **Thanksgiving Recess**

- **Dec 3-5**  **Individual project work**

- **Dec 10-12**  **Project presentation and discussion**