

<b>Course Title/Code:</b>	<b>Advanced Epidemiological Methods I (MMPH6106)</b>
<b>Department:</b>	School of Public Health
<b>Objective:</b>	This course extends the materials covered in Intermediate Epidemiology (CMED6300). The course objective is to use causal inference techniques to identify correctly modifiable targets of intervention to improve population health.
<b>Content:</b>	<p>Course topics include:</p> <ul style="list-style-type: none"> <li>- Causation and causal inference</li> <li>- Structural causal models</li> <li>- Applying structural causal models to study design</li> <li>- Identifying confounders</li> <li>- Effect measure modification</li> <li>- Mediation</li> <li>- Strengths, weaknesses and biases of different epidemiologic study designs</li> <li>- Issues with case-control study design</li> <li>- Misclassification</li> <li>- Instrumental variable analysis</li> <li>- Missing data</li> <li>- Multi-level models</li> </ul>
<b>Learning Outcomes:</b>	<p>By the end of this Course, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Explain the current use of the scientific method in epidemiology, and the different questions answered by considering effects of causes compared to causes of effects.</li> <li>2. Explain the strengths and weaknesses of different ways of thinking about causality in epidemiology at the moment (potential outcomes/counterfactuals versus structural causal models/directed acyclic graphs (DAGs)) and clearly distinguish between risk stratification and causal inference</li> <li>3. Use structural causal models as a guiding principle to identify biases in studies designed to make causal inferences</li> <li>4. Compare the causal inferences which can be made from a randomized controlled trial (RCT), an instrumental variable analysis, a cohort study, and a case-control study</li> <li>5. Explain how consideration of causal partners (effect modifiers) and mediation can be used as a means of strengthening causal inference</li> <li>6. Use the concepts of sensitivity and specificity to assess the effects of misclassification</li> <li>7. Describe the threats to causal inference posed by missing data and current approaches to remediating these biases.</li> <li>8. Explain the use of multi-level models in epidemiology</li> </ol>
<b>Prerequisite:</b>	Introduction to Epidemiology(MMPH6003) and Intermediate epidemiology (MMPH6157)
<b>Duration:</b>	3hours/week; 30 contact hours

**Continuous assessment/  
Examination ratio:** 50%/50%

**Examination method/  
duration:** Written examination / 2 hours

**Remarks:** Approval from the School must be sought prior to enrollment.