



THE UNIVERSITY OF ARIZONA

Mel & Enid Zuckerman  
College of Public Health

**Mel and Enid Zuckerman College of Public Health  
University of Arizona**

**EPID 677 Principles of Genetic Association Studies**

**Catalog Description:** Lectures, forum discussions, and laboratory activities. Topics: selection of appropriate study design for association studies; understanding basic molecular genetics with particular focus on the genetic code; selection of candidate genes; genotype analysis; temporal sequence in genetic association studies; importance of longitudinal data in genetic association studies; genotype versus haplotype analysis; selection of haplotype tagging SNPs; use of genetic software. (3 units)

**Course Topics:**

- Molecular Genetics
- Genetic Dataset Analysis in R
- Population Genetics / Linkage Disequilibrium
- Genetic Association Studies
- Gene-by-Environment Interactions
- Genetic Risk Scores
- Predictions, Sequencing, Biological Annotation
- Genomic Prediction Analysis
- Mendelian Randomization
- Epigenetics

**Course Objectives:** During this course, students will:

- Learn an overview of the concepts, methods, and hands-on applications to design, conduct, and interpret genetic association studies and to conduct genotype analyses.
- Analyze genotype and phenotype data
- Read and critically evaluate genetic epidemiology literature
- Present in both written and oral formats on genetic epidemiology studies

**Learning Outcomes (Competencies Obtained):** Upon completion of this course students will be able to:

1. Search, describe and summarize findings from the scientific literature to describe the epidemiology of a public health problem, identify health disparities and identify risk factors
2. Compare the relative strengths and weaknesses of epidemiological study designs, and choose the most appropriate design for specific research questions
3. Calculate and interpret appropriate measures of disease frequency and excess risk across multiple study designs
4. Assess and identify strategies to minimize bias in analytic, along with assessing effect modification and confounding, then stratifying or adjusting as appropriate in analyses
5. Critique and synthesize appropriate literature and research findings to address a research question
6. Identify potential sources of bias for various study designs and their impact on study quality
7. Conduct descriptive and analytic analyses, including strategies to assess confounding and effect modification methods, to make statistical inferences
8. Demonstrate ability to manage and analyze epidemiological data from a variety of sources
9. Organize and deliver clear presentations of research findings in varying professional formats to diverse audiences

10. Evaluate the integrity, comparability, and limitations of data to make inferences related to analyses and results
11. Lead group interactions competently, ethically, respectfully and professionally to diverse audiences
12. Organize and deliver clear presentations of research findings in varying professional formats to diverse audiences