Molecular Epidemiology (MS) Learning Objectives

The goal of the M.S. program in Molecular Epidemiology is to provide students with training in the field of epidemiology with a special emphasis in the incorporation of tools and knowledge from the basic biological sciences. It is also the goal of the program to advance the knowledge of the causes and mechanisms of disease and disease progression and their applications to public health by using an integrative approach. This M.S. program provides students with the foundational training in statistical methods and statistical software to apply to common statistical problems that arise in biomedical research as well as training in epidemiological methods and concepts, including study design, bias, statistical analysis and data interpretation that are necessary to conduct high quality research in the biological and health sciences. Additionally, the program offers training in biological sciences that can provide novel tools and knowledge, which can inform and enhance population-based studies, such as human genetics, molecular and cellular biology, systems physiology and pathology. Students in the program will have training that prepares them for employment related to the application of biostatistical methods in biomedical research and practice, epidemiological methods and concepts, and integrative epidemiological approaches that apply cutting edge technologies and biomarkers. Graduates of this program work in fields of public health, epidemiologic research and service settings, and industry settings. They will also have background for further graduate studies in epidemiology and biomedical sciences.

The goals of our M.S. program in Molecular Epidemiology are therefore to provide:

1. Solid grounding in the standard techniques of statistical analysis and study design
2. A background in underlying mathematical statistical theory
3. A thorough understanding of the use of standard statistical software for statistical analysis and data management and reporting
4. Knowledge and application of a variety of epidemiologic concepts and methods to the study of population health, including:
   - Detailed understanding of standard techniques for analysis of continuous, categorical, time-to-event, univariate and multivariate, cross-sectional and longitudinal data
   - Modern methods for statistical computation, including standard statistical packages and programming
   - Best-practice principles and techniques for data management and reporting of study conduct,
   - Experience in analyzing, summarizing and reporting a variety of biomedical research problems, including data arising from basic science, observational studies, clinical trials, and public health data
• Development of epidemiologic concepts and principles, including study designs, study biases, and analysis of case-control and cohort data
• Knowledge on biological subjects relevant for human genetics, molecular biology, human physiology, and pathology
• Integrational use of biomarkers in population-based research