Epidemiology and Biostatistics

Epidemiology and biostatistics are the quantitative sciences of public health, investigating causes and prevention of disease and injury, and assessing patterns of health in populations around the globe. This certificate provides training in design, statistical programming, data analysis, and valid interpretation of experimental (e.g. clinical) trials and observational studies. Students will gain knowledge and skills in the methods required to conduct and communicate public health research.

Upon graduation, students will be able to:

- Calculate and apply appropriate epidemiologic and statistical measures to draw valid inferences and summaries from public health data.
- Evaluate the strengths and limitations of epidemiologic and statistical reports from public health studies.
- Analyze key sources of public health data, reflecting comprehension of the basic ethical and legal principles pertaining to the collection, maintenance, analysis, and dissemination of epidemiologic and public health information.
- Synthesize the results of epidemiologic and statistical analyses to craft public health messages in written/oral presentations for both public health professionals and external audiences. Demonstrate the application of epidemiology and biostatistics for informing etiologic research, planning, and evaluation of interventions, public health surveillance, or health policy.
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Course Requirements

- **BS 723 Introduction to Statistical Computing (4 cr)** or **BS 730 Introduction to R: Software for Statistical Computing (4 cr)**
- **EP 770 Concepts and Methods in Epidemiology (4 cr)**
- **4 credits of the following study criticism courses:**
  - **EP 722 Data Collection Methods for Epidemiologic Research (2 cr)**
  - **EP 730 Epidemiology of Vaccine Preventable Diseases (2 cr)**
  - **EP 740 Introduction to the Epidemiology of Aging (2 cr)**
  - **EP 748 Drug Epidemiology (4 cr)**
  - **EP 752 Cancer Epidemiology (4 cr)**
  - **EP 755 Infectious Disease Epidemiology (4 cr)**
  - **EP 758 Nutritional Epidemiology (4 cr)**
  - **EP 759 Reproductive Epidemiology (4 cr)**
  - **EP 764 Epidemiology of HIV/AIDS in the Developed and Developing World (2 cr)**
  - **EP 775 Social Epidemiology (4 cr)**
  - **EP 784 Epidemiology of Tuberculosis in the Developed and Developing World (2 cr)**
  - **EP 790 Mental Health Epidemiology (4 cr)**
  - **EP 850 Applications of Intermediate Epidemiology (4 cr)**
  - **EP 857 Design and Conduct of Cohort Studies (2 cr)**
  - **EP 858 Design and Conduct of Case-Control Studies (2 cr)**
  - **EH 757 Environmental Epidemiology (4 cr)**
  - **GH 801 How to License a New Vaccine (4 cr)**
  - **MC 759 Perinatal and Child Health Epidemiology (4 cr)**
- **One of the following data analysis courses:**
  - **BS 805 Intermediate Statistical Computing and Applied Regression Analysis (4 cr)**
  - **BS 820 Logistic Regression and Survival Analysis (4 cr)**
  - **BS 835 Applied Intermediate Biostatistics (4 cr)**
  - **BS 845 Data Science and Statistical Modeling in R (4 cr)**
  - **BS 851 Applied Statistics in Clinical Trials I (4 cr)**
  - **BS 852 Statistical Methods in Epidemiology (4 cr)**
  - **BS 858 Statistical Genetics I (4 cr)**
Integrative Learning Experience
Students in the Epidemiology and Biostatistics certificate will have the option to conduct a data analysis or critical evaluation of the published literature.

Career Paths
Graduates are well-suited to take on roles in a variety of settings, including academic research, contract research organizations (CRO’s), governmental agencies, health delivery systems, insurers, pharmaceutical and biotechnology companies, medical device companies, and public health research firms. Possible job titles include Research Manager, Data Manager, Research Analyst, Data Analyst, Study Coordinator, Epidemiologist or Associate Epidemiologist, Biostatistician, Surveillance Epidemiologist, Public Health Officer, Consultant, and SAS Programmer.

Epidemiology and Biostatistics Electives Courses
- BS 722 Design and Conduct of Clinical Trials (4 cr)
- BS 728 Public Health Surveillance, a Methods Based Approach (2 cr)
- BS 750 Essentials of Quantitative Data Management (2 cr)
- BS 810 Meta-Analysis for Public Health & Medical Research (4 cr)
- BS 821 Categorical Data Analysis (4 cr)
- EP 721 Survey Methods for Public Health (4 cr)
- EP 762 Clinical Epidemiology (4 cr)
- EP 763 Genetic Epidemiology (4 cr)
- EP 800 Microbes and Methods: Selected Topics in Outbreak Investigation (2 cr)
- EP 813 Intermediate Epidemiology (4 cr)
- EP 817 A Guided Epidemiology Study (4 cr)
- EP 820 Perspectives on Epidemiologic Studies (2 cr)
- EP 854 Advanced Epidemiology (4 cr)
- EP 860 Novel Analytical Methods for Epidemiology (4 cr)
- EP 861 Quantitative Bias Analysis Methods for Epidemiologic Research (2 cr)
- EP 862 Simulated Problems for Learning Epidemiology (SimPLE) (2 cr)
- GH 811 Applied Research Methods in Global Health (4 cr)
- PH 780 Chronic Disease: A Public Health Perspective (2 cr)