The program leading to an M.P.H. degree in epidemiology provides theoretical and practical training applicable to a variety of public health issues. Two concentrations are offered by the program, and each is designed to meet a particular professional need.

**Learner outcomes**

Upon completion of this program, the graduate should be able to:

- Assist in design and implementation of health research studies—including formulating research questions, determining appropriate study design, data collection, statistical analyses, data interpretation, and reporting of results.
- Collaborate with or serve as a research consultant to health professionals.
- Be familiar with disease surveillance and response, and with basic screening theory.
- Critically review the health literature.
- Experience contemporary advancements in epidemiologic methods (research epidemiology).
- Demonstrate understanding of the basic theory and practice of clinical trials (medical epidemiology).

**Educational effectiveness indicators**

Program learner outcomes as evidenced by:

- Signature assignments linked to course and noncourse requirements
- Field practicum report
- Culminating experience (http://llucatalog.llu.edu/public-health/masters-degrees/#mphtext)

**Prerequisite**

In addition to the entrance requirements for all M.P.H. degrees (http://llucatalog.llu.edu/public-health/masters-degrees/#admissionstext), applicants to the M.P.H. degree program in epidemiology must have:

- College algebra or equivalent (calculus preferred)
- Additional prerequisites specific to chosen concentration

**Concentrations**

**Medical epidemiology**

The M.P.H. degree in medical epidemiology specifically targets health professionals (e.g., M.D., nurses, P.T., O.T., pharmacists) who are interested in becoming proficient in research or in practicing epidemiology in a public health setting (e.g., public health department, CDC, cancer registries, WHO) or clinical setting (hospital epidemiologists).

**Concentration-specific prerequisite in addition to prerequisites required for the degree**

- A health-care-related degree
- Bachelor's degree or master's degree with two years of postgraduate direct patient-care experience: (e.g., nursing, social work, dental hygiene, physical therapy, occupational therapy, psychology)

- Accepted into or completed clinical practice-related doctoral degree program: (e.g., M.D., D.O., D.D.S., D.N.P., D.P.T., Pharm.D.). Must have completed at least two years in a clinical program.

**Research epidemiology**

Research epidemiology is designed for persons interested in a career studying the relationship of risk factors to a variety of disease outcomes (e.g., the effect of nutrients, inactivity, stress, high blood pressure, environmental exposure, obesity, heart disease, cancer, osteoporosis, longevity, infectious diseases, reproductive outcomes, etc.).

**Concentration-specific prerequisites in addition to prerequisites required for the degree**

- Three semester or four quarter undergraduate courses in the biological sciences

**Program requirements**

**Medical epidemiology concentration**

<table>
<thead>
<tr>
<th>Public health core</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PCOR 501</td>
<td>Public Health for Community Resilience</td>
</tr>
<tr>
<td>PCOR 502</td>
<td>Public Health for a Healthy Lifestyle</td>
</tr>
<tr>
<td>PCOR 503</td>
<td>Public Health and Health Systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Major</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDM 509</td>
<td>Principles of Epidemiology</td>
</tr>
<tr>
<td>EPDM 510</td>
<td>Epidemiologic Methods I</td>
</tr>
<tr>
<td>EPDM 511</td>
<td>Epidemiologic Methods II</td>
</tr>
<tr>
<td>EPDM 512</td>
<td>Epidemiologic Methods III</td>
</tr>
<tr>
<td>EPDM 515</td>
<td>Clinical Trials</td>
</tr>
<tr>
<td>EPDM 635A</td>
<td>Epidemiological Studies of Seventh-day Adventists A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Religion</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RELE 534</td>
<td>Ethical Issues in Public Health (or REL_)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electives</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDM 5__</td>
<td>Epidemiology Elective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Research project</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDM 699A</td>
<td>Applied Research</td>
</tr>
</tbody>
</table>

**Total Units** 57

**Field experience**

Practicum units are in addition to the minimum didactic units required for the degree

**Public health core**

| PCOR 501 | Public Health for Community Resilience | 5 |

1 Chosen in consultation with advisor
Based on full-time enrollment; part time permitted.

Research Epidemiology concentration — 2.33 years (9 academic quarters)

Medical Epidemiology concentration — 2 years (8 academic quarters)

Normal time to complete the program

Medical Epidemiology concentration — 2 years (8 academic quarters) based on full-time enrollment; part time permitted

Research Epidemiology concentration — 2.33 years (9 academic quarters) based on full-time enrollment; part time permitted

Courses

**EPDM 414. Introduction to Epidemiology. 3 Units.**

Methods and strategies used to investigate distribution, determinants, and prevention of disease in human populations. Disease classification, measures of disease frequency and relative effect, and methods used to isolate effects. Assessments of environmental conditions, lifestyles, and other determinants of disease. Interpretation of results and statistical associations. Critical evaluation of scientific literature. Student presents personal literature study. Laboratory included. Prerequisite or concurrent: STAT 414.

**EPDM 509. Principles of Epidemiology. 3 Units.**

Outlines the principles and methods used to investigate the distribution, determinants, and prevention strategies for disease in human populations. Major topics include: measures of disease frequency; measures of effect; measures of potential impact; comparison and contrast of study designs; methods to identify and control confounding; methods to improve validity, information, and selection bias; methods to assess causation, evaluate statistical significance, evaluate screening for latent disease, and interpret results. Laboratory included. Prerequisite or Concurrent*: STAT 509 or STAT 521*, AHCJ 472 or AHCJ 572; or consent of instructor.

**EPDM 510. Epidemiologic Methods I. 3 Units.**

First course in a three-course epidemiologic methods sequence. Covers causation, study design, validity, confounding, and interaction. Includes causal inference; basic study designs (descriptive and analytic designs, age-cohort-period effects, ecologic studies); disease frequency measures; exposure-disease associations measures, validity (information bias, selection bias, internal and external validity, duration ratio bias, point prevalence complement ratio bias, bias in screening, publication bias); methods for correcting for bias (selection ratios, correction for measurement error, introduction to calibration studies); methods of assessment of validity and reliability (i.e., correlations, Bland-Altman plot, intraclass correlation, coefficient of variability, percent agreement, kappa, sensitivity analysis); advanced topics on confounding, interaction, stratification, and adjustment. Includes problem sets, analysis of epidemiologic data (SAS & R), and case studies based on reports from epidemiology journals. Prerequisite: EPDM 509; STAT 521; or consent of instructor.

**EPDM 511. Epidemiologic Methods II. 3 Units.**

Second course in the epidemiologic methods sequence. Advanced study designs and multivariable modeling of exposure-disease relationships. Focuses on hybrid designs (nested case control, case cohort, and case crossover) and incomplete designs (proportion, ecologic, spatial studies). Multivariable modeling modules introduce generalized linear models (emphasizing linear, logistic, and Poisson) and maximum likelihood theory. Model-building approach includes causal diagrams, methods of variable selection and specification, testing for confounding and interaction, and trend testing. Multivariable modeling of prospective cohort study data with Cox proportional hazard modeling includes coverage of survival analysis concepts (nonparametric survival analysis, life tables, hazard and survival functions). Models nonproportional hazards in a survival analysis. Includes exercises that focus on writing up and presenting the findings from multivariable modeling for submission to biomedical journals; as well as problem sets, data analysis (SAS & R), case studies based on reports from the epidemiology journals, and written reports. Prerequisite: EPDM 510; STAT 522; or consent of instructor.
EPDM 512. Epidemiologic Methods III. 3 Units.
Third course in the epidemiologic methods sequence. Uses case studies of material from the preceding courses to provide experience analyzing epidemiologic data. Covers advanced methods of epidemiologic investigation, including advanced causal inference, spline regression, measurement error correction, multiple imputation, complex survey design and analysis (stratified multistage cluster designs), and meta-analysis. Final module includes power and sample size calculations for the regression models covered during the course sequence. Includes readings (textbook and recent journal articles on epidemiologic methods); data analysis in a computer laboratory setting using SAS, R, and SUDAAN; and case studies based on reports from epidemiology journals. Prerequisites: EPDM 511, STAT 522; or consent of instructor.

EPDM 515. Clinical Trials. 3 Units.
Theory and practice of intervention studies, including community and clinical trials. Course includes components of a trial protocol, different types of trial design, analysis methods, and ethical considerations. Prerequisite: EPDM 509; STAT 509 or STAT 521.

EPDM 525. Special Topics in Epidemiology. 1-4 Units.
Lecture and discussion on a current topic in epidemiology. May be repeated for a maximum of 4 units applicable to degree program. Prerequisite or concurrent: EPDM 509.

EPDM 544. Epidemiology of Infectious Disease. 3 Units.
Introduces the fundamental epidemiologic concepts, methods, and principles in the study of infectious diseases of public health significance. Emphasizes "old" diseases that remain real or potential problems; diseases with changing ecology due to the development of drug/vector resistance and advances in treatment, immunizations, and other preventive/control measures; and emerging and re-emerging diseases that have increasingly become problems through the evolution of modern society. Discusses the role of surveillance systems in infection control in varied settings. Explores the potential of developing appropriate public health interventions in the context of prevention, control, and possibly eradication programs. Prerequisite or Concurrent: EPDM 509.

EPDM 555. Epidemiologic Methods in Outcomes Research and Continuous Quality Improvement. 3 Units.
Epidemiologic methods of outcomes research and continuous quality improvement techniques in medical care processes. Medical care as a process, use of control charts in process improvement, measurement of quality of care, and patient satisfaction with medical care. Cost benefit, cost effectiveness, cost utility, and decision-tree analysis applied to medical care and public health. Laboratory includes: demonstration of process control charts, flow charts, Pareto diagram, decision tree, and data scanning. Prerequisite: EPDM 509 or EPDM 510.

EPDM 565. Epidemiology of Cancer. 3 Units.
Critically reviews epidemiology of the major causes of cancer occurrence and death in developed nations, including anatomic (ICD-9 and ICD-0-2/3) and morphologic/pathogenic (ICD-0-2/3) classifications schemes. Emphasizes research and health-promotion issues that relate to control and prevention of cancer. Topics include pathology vocabulary; multistage model of carcinogenesis; sources of cancer data; validity and value of population measures of cancer; magnitude of the cancer problem; trends in cancer frequency, incidence, mortality, and survival; surveillance objectives and methods; consistent risk and protective factors for major cancer types; the role of infectious diseases in cancer etiology and progression; nutrition and cancer; screening objectives, recommendations, and controversies; and interactions between environmental and genetic characteristics in cancer causation. Prerequisite: EPDM 509.

EPDM 566. Epidemiology of Cardiovascular Disease. 3 Units.
Descriptive epidemiology of the major cardiovascular diseases, including: myocardial infarction, sudden death, angina pectoris, hypertension, and stroke. Acquaintance with experimental designs and analytic techniques commonly used in cardiovascular epidemiology. Experimental and epidemiological evidence relating risk factors such as diet, smoking, blood lipids, blood pressure, and exercise to cardiovascular diseases. Acquaintance with the design and results of the major intervention studies. Prerequisite: EPDM 509.

EPDM 567. Epidemiology of Aging. 3 Units.
Global demographic trends, determinants, and measures of population-age structure. Health, morbidity, disability, and mortality; comprehension of morbidity and mortality; mechanisms, biomarkers, and genetics of aging. Aging research: surveys, clinical trials, and ethics. Chronic conditions/diseases (i.e., dementia, musculoskeletal conditions, osteoporosis, obesity, diabetes, cardiovascular disease); risk factors (i.e., diet, smoking, physical activity); and prevention. Economic aspects, drug use. Laboratory includes critical evaluation of current literature reports. Prerequisite or concurrent: EPDM 509 or EPDM 510; STAT 509 or STAT 521.

EPDM 588. Environmental and Occupational Epidemiology. 3 Units.
Evaluates epidemiologic principles and methodologic approaches used in the assessment of environmental exposure, selection of applicable study designs, and determination of analytic methods used in the investigation of environmental health problems within populations. Epidemiologic analysis of selected and controversial environmental exposures that impact significantly on public health practice and on disease morbidity and mortality outcomes. Prerequisite: EPDM 509 or EPDM 510; STAT 509 or STAT 521.

EPDM 605. Seminar in Epidemiology. 1 Unit.
Presentations and discussions of topics of current interest in epidemiology and statistics. Doctoral students work in groups on topics selected at the beginning of the quarter. Requires a written report and oral presentation at the completion of a project. Seminar facilitates maximal interaction among doctoral students and faculty to facilitate professional development. Students required to enroll Fall Quarter each year they are in the program, but attendance and participation are required Fall, Winter, and Spring quarters.

EPDM 606. Doctoral Seminar in Epidemiology. 1 Unit.
Presentation and discussion of topics of current interest in epidemiology and statistics. Groups work on topics selected at the beginning of the quarter. Requires a written report and oral presentation at the completion of a project. Opportunity for maximal interaction among doctoral students and faculty to facilitate professional development. Students enroll Fall, Winter and Spring quarters during years 1, 2, and 3 of the program to complete a minimum of 9 units; and are strongly encouraged to enroll through the remaining years in the program.

EPDM 625. Special Topics in Epidemiology. 1-3 Units.
Lecture and discussion on a current topic in epidemiology. May be repeated for a maximum of 6 units applicable to degree program. Recommended for doctoral students. Prerequisite: EPDM 509.

EPDM 635A. Epidemiological Studies of Seventh-day Adventists. 1 Unit.
Background, objectives, methodologies, results, and public health implications of most epidemiological studies conducted on Seventh-day Adventists worldwide, but especially in California. Data on the health behaviors and health/disease experience of this low-risk population. Discussion of potential biases and other issues. Prerequisite or concurrent: EPDM 509.
EPDM 635B. Epidemiological Studies of Seventh-day Adventists B. 1 Unit.
Discusses methodological issues pertinent to studies of Adventists, including the evidence for the longevity of California Adventists. Student critically evaluates current literature on epidemiologic studies of Adventists—including a thorough discussion of lifestyle, selection, and survival hypotheses—and presents findings during a discussion session. Student writes a scholarly paper on one topic relevant to epidemiologic studies among Adventists. Prerequisite or concurrent: EPDM 635A.

EPDM 685. Preliminary Research Experience. 2 Units.
Experience gained in various aspects of research under the guidance of a faculty member and by participation in an ongoing project. Must be completed prior to beginning dissertation research project. Limited to doctoral degree students.

EPDM 694. Research. 1-14 Units.
Independent epidemiologic research program arranged with faculty member(s) involved. Written report and oral presentation required. Prerequisite: Consent of instructor responsible for supervision and of academic advisor.

EPDM 697. Dissertation Proposal. 1-10 Units.
Student develops the written dissertation proposal. Doctoral dissertation committee chairman works with the student on mutually agreed-upon objectives. Evaluation based on the accomplishment of these objectives. Culminates in a written and oral dissertation proposal defense and advancement to candidacy. Doctoral students only. Successful completion of comprehensive exams.

EPDM 698. Dissertation. 1-14 Units.
Based on the doctoral research study, student writes a dissertation in submitted-paper format, submits the individual manuscripts to scientific journals, and responds to reviewers' comments. Prerequisite: EPDM 697 and advancement to candidacy.

EPDM 699A. Applied Research. 1 Unit.
Independent epidemiologic research. Research program arranged with faculty member(s) involved. Written report and oral presentation required.

EPDM 699B. Applied Research. 1 Unit.
Independent epidemiologic research. Research program arranged with faculty member(s) involved. Written report and oral presentation required.

EPDM 699C. Applied Research. 1 Unit.
Independent epidemiologic research. Research program arranged with faculty member(s) involved. Written report and oral presentation required.

EPDM 699D. Applied Research. 1 Unit.
Independent epidemiologic research. Research program arranged with faculty member(s) involved. Written report and oral presentation required.