**Pharmaco-epidemiology Concentration**

The pharmaco-epidemiology concentration prepares students to interpret and apply state-of-the-art epidemiologic approaches to study utilization and comparative effectiveness/safety of healthcare interventions using a variety of complex data sources (e.g., administrative healthcare claims, electronic health records, and registries). Students in this concentration can tailor their coursework to develop expertise in the methodologies of greatest interest to them, focused on quantitative methods, including predictive analytics and causal inference.

Through completion of the required course work listed below, students who complete the PhD in DPOP with a concentration in pharmaco-epidemiology will also fulfill the requirements for a Minor in Epidemiology from the UNC Gillings School of Global Public Health. Prior to enrollment in your first semester of classes, you will coordinate with your advisor to formally declare your intention to minor, which you can opt out of at a later time if desired.

**REQUIRED COURSEWORK FOR PHARMACO-EPIDEMIOLOGY CONCENTRATION**

(\* denotes that course is required for all DPOP PhD students)

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| **Topic/course** | **Credit hours** |
| \* DPOP 803. Social and Behavioral Aspects of Pharmaceutical Use | 3 |
| \* DPOP 806. Pharmaceutical Policy | 3 |
| \* DPOP 872. Proposal Writing | 3 |
| \* DPOP ---. Implementation Science (New course! Number to be determined) | 1.5 |
| \* PHRS 801. Ethics | 1 |
| \* PHRS 899. DPOP Student and Faculty Seminar | 4 |
| \* PHRS 994. Doctoral Dissertation | 6 |
| \* EPID 710. Fundamentals of Epidemiology | 5 |
|  EPID 705. Introduction to Deductive and Probability Logic in Epidemiology | 2 |
|  EPID 715. Theory and Quantitative Methods in Epidemiology | 4 |
|  EPID 716. Epidemiologic Data Analysis | 3 |
| \* EPID 765. Methods and Issues in Pharmacoepidemiology | 3 |
|  Biostatistics courses (see below for recommendations and options) | 6 |
|  Electives (see below for recommendations and options) | 9 |
| **Minimum required total** | **54.5** |
| ***Strongly Recommended*** DPOP 870. Pharmaceutical Outcomes Research Methods for students in 2nd or 3rd year, focuses on the implementation of advanced methods in pharmaceutical outcomes research (Spring Semester Odd Years) | 3 |

**BIOSTATISTICS COURSES**

Students in the pharmaco-epidemiology concentration are required to take a minimum of 6 credit hours in biostatistics classes. In addition to the formal biostatistics requirement detailed below, students should consult with their advisor to develop a specific plan for advanced methods training.

In your 1st semester, there are two recommended options (choose one only):

* **BIOS 600. Principles of Statistical Inference** (3 credits). Major topics include elementary probability theory, probability distributions, estimation, hypothesis testing, chi-square procedures, regression, and correlation.
* **BIOS 662. Intermediate Statistical Methods** (4 credits). Principles of study design, descriptive statistics, and sampling from finite and infinite populations, with particular attention to inferences about location and scale for one, two, or k sample situations. Both distribution-free and parametric approaches are considered. Gaussian, binomial, and Poisson models, one-way and two-way contingency tables, as well as related measures of association, are treated.

In your 2nd semester, there is one recommended biostatistics course:

* **BIOS 545. Principles of Statistical Inference** (3 credits). Continuation of BIOS 600; the analysis of experimental and observational data, including multiple regression, and analysis of variance and covariance.

**Starting in your 3rd semester, you should work with your advisor to select additional methods courses that best align with your interest and training needs. The section below on elective courses can serve as a useful starting point for some of those decisions.**

**ELECTIVE COURSES**

**Strongly Recommended: Additional methods training that can count toward the 9-credit elective requirement.** We highly recommend students in the pharmaco-epidemiology concentration take advanced methods courses beyond the requirements listed above. Students should consult regularly with their advisor to select from many available options. Recommended additional methods courses include (but are not limited to):

* **DPOP/EPID 766. Epidemiologic Research Using Healthcare Databases** (3 credits). This course focuses on how healthcare utilization data are generated and how to use databases to identify study populations and conduct epidemiologic studies of utilization patterns and comparative effectiveness/safety of prescription drugs and healthcare services. A major component of this course is an independent (or small group) project using IBM Watson Marketscan claims data.
* **EPID 718. Analytic Methods in Observational Epidemiology** (3 credits). This course covers general epi concepts and applications, including logistic regression, binomial regression, model building strategy, additive and multiplicative interaction, and graphical exploration of data.
* **EPID 722. Epidemiologic Analysis of Time-to-Event Data** (4 credits). This course covers epidemiologic analysis of time-to-event data and emphasizes weighing threats to the accuracy of inferences.

**Other recommended electives for students in the pharmaco-epidemiology concentration.** A number of graduate level elective courses that are relevant to the pharmaco-epidemiology concentration are offered at UNC. We list several below but encourage students to review course offerings each semester to find courses that are of greatest interest to them. A long list is provided below, but it is not exhaustive; you can work with your advisor to help select optimal courses for your trajectory.

* EPID 719. Readings in Epidemiologic Methods. (1 credit)
* EPID 731. Systematic Review and Meta-Analysis (1)
* EPID 733. Clinical Trials in Epidemiology (3)
* EPID 735. Cardiovascular Epidemiology (3)
* EPID 742. Biomarkers in Population-Based Research (2)
* EPID 743. Genetic Epidemiology: Methods and Applications (3)
* EPID 750. Fundamentals of Public Health Surveillance (3)
* EPID 751. Emerging and Re-Emerging Infectious Diseases (3)
* EPID 753. Prevention and Control of Infectious Diseases at the Level of the Community (3)
* EPID 754. Advanced Methods in Infectious Disease Epidemiology (3)
* EPID 755. Introduction to Infectious Disease Epidemiology (3)
* EPID 756. Control of Infectious Diseases in Developing Countries (3)
* EPID 757. Epidemiology of HIV/AIDS in Developing Countries (3)
* EPID 760. Vaccine Epidemiology (3-4)
* EPID 764. Hospital Epidemiology (1-2)
* EPID 770. Cancer Epidemiology and Pathogenesis (3)
* EPID 771. Cancer Epidemiology: Survivorship and Outcomes (3)
* EPID 772. Cancer Prevention and Control Seminar (3)
* EPID 775. Advanced Cancer Epidemiology: Classic and Contemporary Controversies in Cancer Causation (2)
* EPID 785. Environmental Epidemiology (3)
* EPID 786. Community-Driven Epidemiology and Environmental Justice (2)
* EPID 787. Advanced Environmental Epidemiology (3)
* EPID 790. Intervention Epidemiology (2)
* EPID 795. Introduction to Public Health Informatics (1)
* EPID 813. Nutritional Epidemiology (3)
* EPID 814. Obesity Epidemiology (3)
* EPID 826. Introduction to Social Epidemiology (3)
* EPID 827. Social Epidemiology: Design and Interpretation (2)
* EPID 851. Reproductive and Perinatal Epidemiology (3)
* EPID 853. Advanced Topics in Perinatal and Pediatric Epidemiology (2)

Although it may not be used toward the elective requirement, DPOP students in the pharmaco-epidemiology concentration are strongly encouraged to attend **EPID 893, the Pharmacoepidemiology Seminar**. Offered every semester, this is a weekly seminar to explore current problems in pharmacoepidemiology and share research in a friendly but formal environment. Students may enroll in this 1-credit seminar as many times as they wish, but enrollment is not required in order to attend the seminar.