

MASTER OF SCIENCE EPIDEMIOLOGY SPECIALIZATION IN BIostatISTICS

Summary

- Degree offered: Master of Science (MSc)
- Registration status option: Full-time
- Language of instruction: English
- Primary program: MSc in Epidemiology
- Collaborative specialization: Biostatistics
- Program option (expected duration of the program):
 - with thesis (6 full-time terms; 24 consecutive months)
- Academic units: Faculty of Medicine (<http://med.uottawa.ca/en>), School of Epidemiology and Public Health (<http://med.uottawa.ca/epidemiology>).

Program Description

The purpose of the programs is to provide a scholarly environment for the health sciences community that will stimulate and enhance learning and expand knowledge by conducting research. Graduates are professional experts or consultants who can advise persons and agencies in other fields.

The School is a participating unit in the biostatistics program (at the master's level).

Collaborative Program Description

The Ottawa-Carleton Institutes combine the research strengths of the University of Ottawa and Carleton University. The Institutes offer graduate programs leading to the master's (MSc) and doctoral (PhD) degrees in several fields (biology, chemistry, earth sciences, etc.).

Biostatistics is an interdisciplinary area of research linking statistics, biology, medicine, and health sciences. This growing area demands knowledge of the theory behind statistical procedures, an ability to put that theory into practice, and an understanding of the area of application. The applications range from clinical trials to population epidemiology and the development of new procedures. The specialization is intended to prepare a graduate for a career as a biostatistician in a health-related industry, or for a career in research.

Main Areas of Research

The faculty members of the School come from a wide variety of academic backgrounds and interests. The School has an active research program, involving extensive collaborations with other groups. Active areas of research include:

- Etiological Epidemiology
- Social Epidemiology
- Clinical Epidemiology & Health Services Research

Other Programs Offered Within the Same Discipline or in a Related Area

- Graduate Diploma in Population Health Risk Assessment and Management
- Master of Science Epidemiology (MSc)
- Doctorate in Philosophy Epidemiology (PhD)

Fees and Funding

- Program fees:

The estimated amount for university fees (<https://www.uottawa.ca/university-fees>) associated with this program are available under the section Finance your studies (<http://www.uottawa.ca/graduate-studies/programs-admission/finance-studies>).

International students enrolled in a French-language program of study may be eligible for a differential tuition fee exemption (<https://www.uottawa.ca/university-fees/differential-tuition-fee-exemption>).

- To learn about possibilities for financing your graduate studies, consult the Awards and financial support (<https://www.uottawa.ca/graduate-studies/students/awards>) section.

Notes

- Programs are governed by the general regulations (<http://www.uottawa.ca/graduate-studies/students/general-regulations>) in effect for graduate studies and the regulations in effect at Carleton University.
- In accordance with the University of Ottawa regulation, students have the right to complete their assignments, examinations, research papers, and theses in French or in English.

Program Contact Information
**Graduate Studies Office, Faculty of
Medicine** ([https://med.uottawa.ca/
graduate-postdoctoral](https://med.uottawa.ca/graduate-postdoctoral))
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Twitter | Faculty of Medicine ([https://
twitter.com/uOttawaMed](https://twitter.com/uOttawaMed))

Youtube | Faculty of Medicine
([https://www.youtube.com/channel/
UCP2nDlrjFEetyfMiOml2HA](https://www.youtube.com/channel/UCP2nDlrjFEetyfMiOml2HA))

Flickr | Faculty of Medicine ([https://
www.flickr.com/photos/uottawamed](https://www.flickr.com/photos/uottawamed))

Admission Requirements

For the most accurate and up to date information on application deadlines, language tests and other admission requirements, please visit the specific requirements ([https://www.uottawa.ca/graduate-studies/
programs-admission/apply/specific-requirements](https://www.uottawa.ca/graduate-studies/programs-admission/apply/specific-requirements)) webpage.

To be eligible, candidates:

- Must have completed an honours undergraduate degree in a quantitative discipline such as: mathematics, statistics, applied statistics, biostatistics, quantitative psychology, or any other discipline with with a strong background in mathematics or statistics. The program of study must have included at least:
 - One course in linear algebra;
 - Two courses in calculus;
 - A course in basic probability and statistics (using Calculus), and
 - Two advanced courses in Statistics
 - Exposure to computer programs used in data analysis
- Must have a cumulative GPA (calculated in accordance with university guidelines) of at least 7.0 (B+) in the last 60 units (20 courses) of study.
- Must have a strong interest in the application of statistical methods to biology, life sciences, or health sciences, with appropriate university-level study in at least one of these areas.

Language Requirements

Applicants must be able to understand, write and fluently speak the language of instruction (English) in the program to which they are applying. Proof of linguistic proficiency may be required.

Applicants whose first language is neither French nor English must provide proof of proficiency in the language of instruction.

Note: Candidates are responsible for any fees associated with the language tests.

Notes

- The admission requirements listed above are minimum requirements and do not guarantee admission to the program.
- Admissions are governed by the general regulations ([http://
www.uottawa.ca/graduate-studies/students/general-regulations](http://www.uottawa.ca/graduate-studies/students/general-regulations)) in effect for graduate studies and by the general regulations of the Ottawa-Carleton Institute.
- Candidates must apply to the master's programme in epidemiology and indicate in their application that they wish to be accepted into the collaborative specialization in biostatistics.
- International candidates must check the admission equivalencies for the diploma they received in their country of origin.
- students are required to confirm a thesis supervisor prior to their first enrolment in the program. However, students do not have to find a supervisor before applying for admission.
- The thesis supervisor must be a member of the epidemiology graduate program and the specialization in biostatistics. Students may be required to have a co-supervisor to ensure supervision in both statistical and content areas.

Transfer from Graduate Diploma to Master's

Students enrolled in the graduate diploma program can request to transfer to the Master of Science degree in Epidemiology in accordance with section A.7.1 of the general regulations.

Program Requirements Master's with Collaborative Specialization

Requirements for this program have been modified. Please consult the 2018-2019 calendars (<http://catalogue.uottawa.ca/en/archives>) for the previous requirements.

Students must meet the following requirements for the master's with collaborative specialization:

Compulsory Courses:

MED 8166	Professionalism and Professional Skills	
EPI 5240	Epidemiology I- Introductory Epidemiology	3 Units
EPI 5340	Epidemiological Methods	1.5 Units
EPI 5366	MSc Seminar ¹	
EPI 6178	Intervention Studies in Health Research	3 Units
MAT 5317	Analysis of Categorical Data	3 Units
MAT 5375	Mathematical Statistics	3 Units
4.5 optional course units from:		4.5 Units
EPI 5341	Epidemiological Applications	

EPI 5342	Genetic Epidemiology	
EPI 5344	Survival Analysis in the Health Sciences	
EPI 5345	Applied Logistic Regression	
EPI 5346	Applied Longitudinal and Clustered Data Analysis	
EPI 6278	Advanced Clinical Trials	
3 optional course units from:		3.0 Units
MAT 5175	Robust Statistical Inference	
MAT 5177	Multivariate Normal Theory	
MAT 5181	Data Mining I	
MAT 5182	Modern Applied and Computational Statistics	
MAT 5192	Sampling Theory and Methods	
MAT 5193	Linear Models	
MAT 5195	Design of Experiments	
MAT 5196	Multivariate Analysis	
MAT 5318	Reliability and Survival Analysis	
MAT 5992	Seminar in Biostatistics	

Thesis:

THM 7999	Master's Thesis ²	
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Note(s)

- ¹ Participation in approved departmental seminars (bi-weekly community medicine rounds, weekly clinical epidemiology rounds or other approved seminars organized by the Department) is compulsory.
- ² Students are responsible for ensuring they have met all of the thesis requirements (<http://www.uottawa.ca/graduate-studies/students/theses>).

Fast-Track from Master's to PhD

Students enrolled in the master's program in Epidemiology at the University of Ottawa may be eligible to fast-track directly into the doctoral program without writing a master's thesis. For additional information, please consult the "Admission Requirements" section of the PhD program.

Minimum Requirements

The passing grade in all courses is C+.

Students who fail 6 units, the thesis proposal, or whose research progress is deemed unsatisfactory will be withdrawn from the program.

Research

Research Fields & Facilities

Located in the heart of Canada's capital, a few steps away from Parliament Hill, the University of Ottawa is among Canada's top 10 research universities.

uOttawa focuses research strengths and efforts in four Strategic Areas of Development in Research (SADRs):

- Canada and the World
- Health
- e-Society
- Molecular and Environmental Sciences

With cutting-edge research, our graduate students, researchers and educators strongly influence national and international priorities.

Research at the Faculty of Medicine

"The Faculty of Medicine has a long history of conducting both basic and clinical research of the highest quality. Many of our high profile research projects are conducted in partnership with affiliated-teaching hospitals and research institutes. These partnerships lead to biomedical discoveries that have a significant impact on health care. In the process they educate the next generation of Canadian scientists. Our research activity also attracts significant investment, which stimulates the Ottawa economy."

- Dr. Bernard Jasmin, Vice-Dean, Research

Facilities, Research Centres and Institutes at the Faculty of Medicine

- Centre for Neural Dynamics (<http://www.neurodynamic.uottawa.ca>)
- University of Ottawa Centre for Neuromuscular Disease (<http://med.uottawa.ca/neuromuscular>)
- Centre for Research in Biopharmaceuticals and Biotechnology (<http://www.med.uottawa.ca/crbb/eng>)
- Canadian Partnership for Stroke Recovery (<http://www.canadianstroke.ca/en>)
- Kidney Research Centre (<http://www.ohri.ca/centres/KRC/default.asp>)
- University of Ottawa Skills and Simulation Centre (<http://uosscc.ca>)
- Medical Devices Innovation Institute
- Ottawa Institute of Systems Biology (<http://med.uottawa.ca/oisb>)
- University of Ottawa Brain and Mind Research Institute (<http://www.uottawa.ca/brain>)

For more information, refer to the list of faculty members and their research fields on **Uniweb**.

IMPORTANT: Candidates and students looking for professors to supervise their thesis or research project can also consult the website of the faculty or department (<https://www.uottawa.ca/graduate-studies/students/academic-unit-contact-information>) **of their program of choice. Uniweb does not list all professors authorized to supervise research projects at the University of Ottawa.**

Courses

Not all of the listed courses are given each year. The course is offered in the language in which it is described.

EPI 5126 Introduction to Healthcare Epidemiology (3 units)

Applications of epidemiologic and statistical methods within the healthcare setting; issues specific to infection control; roles and administration of infection control, risk management and quality assurance within healthcare facilities; surveillance mechanisms for nosocomial infections; outbreak investigation methods; infection risks in special populations and settings; prevention and risk management of adverse outcomes; regulatory guidelines and accreditation; emerging issues in infection control.

Course Component: Lecture

EPI 5142 Health Services Evaluation (3 units)

The theory and practice of health services evaluation, including specification of objectives, research designs, measures of process and outcome, and practical problems in conducting evaluations. The focus is on scientific (research) evaluation, but other evaluation strategies and techniques are discussed. Lectures and student presentations.

Course Component: Lecture

Prerequisite: EPI 5240 or equivalent and permission of instructor.

EPI 5143 Epidemiological Research Using Large Databases (3 units)

A practical approach to using administrative and other large databases for epidemiological research. Basic and advanced statistical techniques to manipulate, link, and examine datasets; large health surveys; coding systems; data warehouses; data mining; birth and death registries; use of census data; linking postal codes to geographical files; geographical information systems. Extensive use of SAS as the primary application package.

Course Component: Lecture

Permission of the Department is required.

EPI 5144 Global Health Epidemiology and Practice (3 units)

Global burden of illness; epidemiology of major infectious and non-communicable diseases; global environmental health; maternal and child health, global nutrition, one health. Global health practice, research methods, systematic reviews, knowledge translation, communication, ethics, collaboration, funding, sustainability, publication, evaluation, and evidence for global health action.

Course Component: Lecture

EPI 5145 Globalization and Health Equity (3 units)

Keys to understanding how globalization processes are affecting health. Policy options for creating a fairer and more health equitable globalization. Review of relevant theories from sociology, political science (international relations) and political economy; and of evidence derived from all three disciplines, as well as from public health and epidemiology. Explanatory models for public health practice on a global scale.

Course Component: Lecture

EPI 5180 International Health and Development (3 units)

Presentations and seminars on philosophy of international development, international health and demographics, determinants of health, international health and human rights and humanitarian emergencies, tropical diseases and emerging pathogens, aboriginal health issues, impact of new health technologies on international health, cross cultural communication, management methods for international health. Seminar presentation required.

Course Component: Lecture

EPI 5181 Population Health Risk Assessment I (3 units)

National and international policy frameworks for health risk assessment and management, including determinants of population health; epidemiological, clinical, and toxicological methods for identifying health hazards; population health surveillance; methods of population health risk assessment; regulatory, economic, advisory, and technological approaches to population health risk management; community action and social marketing; selection of risk management strategies; risk perception and risk communication. Lectures and case studies. Preparation of term paper on a current issue in population health risk assessment.

Course Component: Lecture

EPI 5240, (EPI 5242 or MAT 5375) are corequisites to EPI 5181. Courses EPI 5181, PHR 5181 cannot be combined for units.

EPI 5182 Sample Survey Research Methods (3 units)

Comprehensive review of the use of sample surveys in epidemiologic research. Sampling designs and methods. Simple random samples and stratified samples. Multi-stage sampling. Other complex survey designs. Cluster sampling and sample weights. Response and non-response biases. Questionnaire design. Analysis of survey data. Ethics in surveys. Practical issues in surveys. Pre-requisite: Basic understanding of statistical methods and epidemiologic principles.

Course Component: Lecture

EPI 5183 Approaches to Community/Public Health Program Evaluation (3 units)

Critical review and practical application, in collaboration with a health care community partner, of approaches to community and public health program evaluation. Community partners include representatives of the community agencies whose mandate or remit includes evaluation of their community/public health program(s). Evaluation based on student's ability to (a) identify most appropriate approaches to evaluation, (b) critically review strengths and limitations of chosen approaches, (c) apply the selected approach appropriately to examine and quantify impact of the program(s).

Course Component: Lecture

EPI 5188 Health Technology Assessment (3 units)

Definition and scope of health technology assessment; needs assessment; practice variations; use of administrative databases; evaluation of diagnostic tests; development and use of practice guidelines and clinical prediction rules; health technology assessment in the developing world. Lectures, seminars and case studies.

Course Component: Seminar

EPI 5189 Health Economic Evaluation (3 units)

Brief overview of economics and health economics; examination of analyses used in epidemiologic and clinical research: cost-effectiveness analysis, cost-minimization analysis, cost-utility analysis (including determination of utilities), cost-benefit analysis, cost of illness studies and use of economic methods in priority-setting. Lectures and seminars. Written report required, presenting an economic evaluation or a detailed review of the economic literature in a particular area.

Course Component: Seminar

EPI 5210 Public Health Administration (3 units)

Introduction to practical aspects of managing a health unit from the viewpoint of a Medical Officer of Health. The organization of public health services, relationships with the Board, leadership and management, budgeting and human resource issues including labour relations. Problem-based approach in a seminar format.

Course Component: Lecture

EPI 5211 Environmental and Occupational Health (3 units)

This course will familiarize students with the extent and mode of action of environmental influences on health, and with epidemiologic and regulatory methods used in environmental and occupational health. It is intended primarily for M.Sc. students in epidemiology and residents in community medicine. Lectures, presentations by invited experts, case studies, seminar presentations by students.

Course Component: Lecture

EPI 5212 Communicable Disease Epidemiology (3 units)

Consideration of the specialized methods used in the investigation and control of communicable disease. Detailed review of the epidemiology of the major communicable diseases. Lectures, presentations by invited experts, and student presentations.

Course Component: Lecture

EPI 5213 Chronic Disease Epidemiology (3 units)

Review of the descriptive epidemiology (distribution, trends, risk factors) of the major chronic diseases, with emphasis on circulatory diseases, cancer, injuries, and mental health problems. Approaches to primary and secondary prevention. Lectures, presentations by invited experts, and student presentations.

Course Component: Lecture

EPI 5240 Epidemiology I- Introductory Epidemiology (3 units)

An overview of epidemiology - uses, methods, and data sources. Descriptive and analytical epidemiology. Lectures and assignments in which students will work with data and will gain experience in critically reviewing epidemiologic literature.

Course Component: Lecture

Prerequisites: EPI 5242 may be taken concurrently.

EPI 5241 Epidemiology II: Advanced Epidemiology (3 units)

This second level epidemiology course covers major principles of design, analysis, and interpretation of epidemiologic research. Material presented in a quantitative manner.

Course Component: Lecture

Prerequisites: EPI 5240, EPI 6276.

EPI 5242 Biostatistics I (3 units)

Building on the students' prior background in statistics, this course explores the use of mathematical models in statistical data analysis. Topics include analysis of categorical data, choice of linear vs non-linear models, estimation of parameters, testing of hypotheses by parametric and non-parametric methods, analysis of variance, linear and logistic regression models, introduction to survival analysis.

Course Component: Discussion Group, Lecture

Permission of the Department is required.

EPI 5243 Guided Research Projects (3 units)

Practical experience of the application of epidemiologic methods. The student will participate in one or more research projects underway in the Department, and will gain experience in the day-to-day management of the project, in data collection, in data analysis and report preparation.

Course Component: Lecture

EPI 5244 Special Topics in Epidemiology (3 units)

The content of this seminar course is flexible, covering issues of current debate in communicable and non-communicable disease epidemiology. Presentations by participants and invited experts and seminar discussion.

Course Component: Lecture

Prerequisites: EPI 5240, (EPI 5242 or MAT 5375).

EPI 5245 History of Epidemiology (3 units)

This course reviews the evolution of the scientific method in epidemiology, and the contribution of epidemiology to changing ideas about health and disease. It is intended primarily for M.Sc. students in epidemiology, but will also be relevant to residents in community medicine, other students and faculty.

Course Component: Lecture

EPI 5251 Measurement in Health (3 units)

An overview of measurement theory as applied to health measurement; a review of existing measurements of health status in clinical and research applications, plus practical experience of how to develop and test new measurement methods.

Course Component: Lecture

EPI 5271 Health Promotion (3 units)

Origins, theories and techniques of health promotion at the individual and community levels. Examination of current health promotion activities in Canada and elsewhere.

Course Component: Lecture

EPI 5281 Developments in Epidemiology (3 units)

Major new developments in epidemiology, conceptualization of research topics and objectives for the thesis. Critical appraisal of current and classical literature in epidemiology. Seminars on current topics.

Course Component: Lecture

EPI 5330 Vital and Health Statistics and Demography (3 units)

Techniques of demography, health and vital statistics with particular reference to health care and epidemiologic research. The Canadian demographic structure and trends, vital registration procedures, calculation and interpretation of vital rates, life table analysis and record linkage. Lectures and exercises.

Course Component: Lecture

EPI 5340 Epidemiological Methods (1.5 unit)

Major principles of study design and analysis: validity in epidemiologic studies; precision and statistics in epidemiology studies; confounding; additive and multiplicative interaction; stratified analysis; regression models; regression modeling; bias analysis; analytical strategy.

Course Component: Lecture

Prerequisites: EPI 5240, (EPI 5242 or MAT 5375).

EPI 5341 Epidemiological Applications (1.5 unit)

Interpretation of epidemiologic research and some specific topics: complex survey data analysis; attributable risk, odds ratio and relative risk estimation in multivariate analysis; combined effect of multiple exposures and interaction measures; chronic disease screening and surveillance; environmental epidemiology.

Course Component: Lecture

Prerequisite: EPI 5340

EPI 5342 Genetic Epidemiology (1.5 unit)

Scope of genetic epidemiology, including an overview of types of human genetic variation, approaches to gene discovery vs. gene characterization. Specific issues include: assessment of effect of family history on disease risk; measurement of genetic variation, genotyping errors and factors affecting these; study designs specially adapted to genetic epidemiology family based designs (e.g. case-parent trio, case-sib designs), case-only designs; candidate gene and genome-wide association approaches to genetic association; gene-environment and gene-gene interaction; integration of evidence; evaluation of potential value of genetic information in screening (e.g. newborn screening), family history tools and genetic testing.

Course Component: Lecture

Prerequisite: EPI 5340

EPI 5343 Outcome Measures in Health Research (1.5 unit)

Technical review of the design requirements for outcome measures in health research and clinical trials; a historical review of the evolution of such measures and a survey of the quality of existing instruments in various fields of health research (disability, quality of life, mental health, pain, etc.). This course is designed for students who will need to use and interpret health measures in their research.

Course Component: Lecture

Prerequisite: EPI 5340

EPI 5344 Survival Analysis in the Health Sciences (1.5 unit)

Exploration of methods for the analysis of data which includes information about the time when an event occurred. Non-regression methods of analyzing survival data, including actuarial life tables, the Kaplan-Meier method, the log-rank test, and person-time. The hazard curve and its links to incidence rate/density. Proportional hazards regression modelling (Cox modelling) including interpretation of model parameters, model building strategies and assessing the fit of the model. Methods to handle time varying covariates and non-proportional hazards will be discussed. Classes will include hands-on modeling examples using SAS statistical software.

Course Component: Lecture

Prerequisite: EPI 5340

EPI 5345 Applied Logistic Regression (1.5 unit)

Foundation of model estimation: maximum likelihood; modeling dichotomous outcome (dependent) variables: logistic regression; logistic models with several independent variables; interpretation of model parameters; model-building strategies; assessing the fit of the model; regression diagnostics. Classes will include hands-on modeling examples using SAS statistical software.

Course Component: Lecture

Prerequisite: EPI 5340

EPI 5346 Applied Longitudinal and Clustered Data Analysis (1.5 unit)

Introduction to longitudinal (repeated measures) and clustered data and overview of regression models for correlated data; linear mixed effects models: modelling the mean; modelling the covariance structure; generalized estimating equations and generalized linear mixed effects models; regression diagnostics; missing data and drop-out; case studies. Classes will include hands-on modeling examples using SAS statistical software.

Course Component: Lecture

Prerequisite: EPI 5340

EPI 5347 STATA FOR EPIDEMIOLOGICAL ANALYSIS (1.5 unit)

This course will provide a basic introduction to the statistical software STATA. Each session will consist of a lecture and a lab component in which students will get to analyze a dataset under the supervision of the instructor. The course will cover basic commands, data management, graphs, data manipulation, descriptive statistics, and sample size/power calculations. More advanced topics may be covered as well. Students will need to purchase their own version of STATA.

Course Component: Lecture

Prerequisites: EPI 5240, EPI 5242.

EPI 5366 MSc Seminar

Seminars on topics in Epidemiology delivered by program faculty, visiting speakers and/or students. Compulsory attendance and participation during at least the first year of registration in the program. Graded S (Satisfactory) / NS (Not satisfactory).

Course Component: Seminar

EPI 5544 Épidémiologie et pratique de la santé mondiale (3 crédits)

Le fardeau mondial de la maladie; l'épidémiologie des principales maladies infectieuses et non transmissibles; la santé environnementale, les maladies maternelles et infantiles, la nutrition à l'échelle mondiale, l'approche une santé. La pratique en matière de santé mondiale, les méthodes de recherche, les examens systématiques, la transmission du savoir, la communication, l'éthique, la collaboration, le financement, la durabilité, la publication de la recherche, l'évaluation et les données probantes pour l'action en santé mondiale.

Volet : Cours magistral

EPI 5545 Mondialisation et équité en santé (3 crédits)

Pistes pour la compréhension de la manière dont la mondialisation touche à la santé et aux politiques mondiales d'équité en santé. L'examen de théories pertinentes puisées dans la sociologie, la science politique (relations internationales) et l'économie politique, et des données probantes issues de ces trois disciplines, ainsi que de l'épidémiologie et de la santé publique. Modèles explicatifs pour la santé publique à l'échelle mondiale.

Volet : Cours magistral

EPI 5642 Biostatistique I (3 crédits)

En misant sur les connaissances préalables en statistique des étudiants, ce cours examine l'application des modèles mathématiques dans l'analyse de données statistiques. Parmi les sujets à traiter : analyse de données catégoriques, choix de modèles linéaires ou non linéaires, estimation des paramètres, tests d'hypothèses par méthodes paramétriques ou non paramétriques, analyse de la variance, modèles de régression linéaire et logistique, et introduction à l'analyse de survie.

Volet : Cours magistral

Permission du Département est requise.

EPI 5766 Séminaire de M.Sc.

Séminaires sur des sujets en épidémiologie animés par le corps professoral, des conférenciers invités et/ou les étudiants. Présence et participation obligatoires au minimum pendant la première année d'inscription au programme. Noté S (satisfaisant) ou NS (non satisfaisant).

Volet : Cours magistral

EPI 6126 Advanced Healthcare Epidemiology (3 units)

Exploration of advanced healthcare epidemiology topics including pandemic planning, emergency preparedness, environmental considerations, healthcare surveillance techniques, quality improvement and patient safety initiatives, antimicrobial control programs, blood safety, developing and delivering educational programs, healthcare organization and administration, healthcare epidemiology research design. Lectures, presentations by invited experts, workshops and student presentations.

Course Component: Lecture

Prerequisites: EPI 5240, EPI5126.

EPI 6178 Intervention Studies in Health Research (3 units)

Practical introduction to intervention studies in the health field, including experimental and quasi-experimental studies and clinical and community trials. Question formulation; conduct of literature reviews; design issues (choice of research design and study population, implications for validity of results); ethical issues; instrument development; data collection and management; approach to data analysis; report writing and presentation. Examples drawn from both population and clinical research. Development and presentation of proposal for an intervention study.

Course Component: Lecture

EPI 6179 Computer Applications in Medicine (3 units)

A laboratory course introducing health researchers to packaged computer programs for data analysis. Applications of these programs to the participants' own research, the organization of large data files and the choice between different types of computers.

Course Component: Lecture

EPI 6181 Social Aspects of Epidemiology (3 units)

This course will analyze the way in which behavioural, social and emotional forces influence patterns of disease. The links between these processes and physiological changes; inferences on how best to intervene to modify "lifestyle" risk factors; recent prevention and health promotion trials will be reviewed.

Course Component: Lecture

EPI 6182 Population Health Risk Assessment II (3 units)

Scientific methods for population health risk assessment; characterization of population health risks, and attendant uncertainties; risk modeling; combining risk information from different sources; risk acceptability; principles of risk management decision making; evidence-based risk management policy development; audit and evaluation of risk interventions; priority setting; case studies on current population health risk assessment issues. Term paper on a current methodological issue in population health risk assessment required.

Course Component: Lecture

Prerequisites: EPI 5181. The courses EPI 6182, PHR 6182 cannot be combined for credit.

EPI 6188 Systematic Review and Meta- Analysis (3 units)

Approaches to the systematic review of evidence in the health sciences. Searching for the evidence, selection of studies, quality and validity of included studies, heterogeneity, statistical analysis and other quantitative and qualitative methods. Students will be required to do a meta-analysis on a topic of their own interest.

Course Component: Lecture

Prerequisites: EPI 5240, (EPI 5242 or MAT 5375).

EPI 6189 Clinical Decision Making (3 units)

Theories of decision making and their validity in health care applications. Comparison of decision support methods: decision analysis, utility assessment techniques, patient aids, practice guidelines, care maps. Methods for developing, evaluating, and disseminating decision support tools in clinical practice.

Course Component: Lecture

Prerequisites: EPI 5240, (EPI 5242 or MAT 5375).

EPI 6276 Quantitative Methods in Epidemiology (3 units)

Application of advanced topics in statistical methods for epidemiologic data analysis: logistic regression and discriminant analysis, Poisson regression, contingency table analysis (including log-linear modelling), time series, survival analysis, Cox regression with and without time-dependent covariates, principle components and factor analysis.

Course Component: Lecture

Prerequisites: EPI 5240 (may be done concurrently), (EPI 5242 or MAT 5375).

EPI 6277 Biostatistics (3 units)

Focus on the statistical analysis of more than one variable and/or more than two groups. Topics covered include the analysis of variance, multiple linear regression and multivariate analysis topics such as the linear discriminant analysis. Statistical analysis relevant to clinical medicine will be discussed in detail with relevant examples from clinical research papers.

Course Component: Lecture

Prerequisite: EPI 5242 or MAT 5375.

EPI 6278 Advanced Clinical Trials (3 units)

Lectures and laboratories on the detailed principles, design, methodology and statistical techniques associated with clinical trials. Emphasis on emerging topics and procedures.

Course Component: Lecture

Prerequisites: EPI 6178, (EPI 5242 or MAT 5375)-.

EPI 6282 Special Topics in Community Medicine (3 units)

Current Community Health topics will be reviewed. Weekly seminars, written assignments, discussions, research meetings and presentations by students and invited speakers. Each student must present two seminars.

Course Component: Lecture

Prerequisite: Permission of the program director.

EPI 6283 Pharmaco Epidemiology (3 units)

Issues in and methodology of pharmacoepidemiology. Discussion on the biases and confounders possible at every stage of a pharmacoepidemiological study, in drug utilization review, drug effectiveness, risk/benefit assessment and other topics. This course will normally be given every second year.

Course Component: Lecture

Prerequisite: EPI 5240

EPI 6344 Current Issues in Epidemiology (1.5 unit)

Topics will be selected based on student and faculty interests. Depending on the topics, the course may be given as formal lectures or in seminar format with presentations by participants and invited experts followed by in-class discussion.

Course Component: Lecture

Prerequisites: EPI 5240, (EPI 5242 or MAT 5375).

EPI 6345 Introduction to Knowledge Translation in Health Research (3 units)

Identification of a practice/policy issue or concern in epidemiology, public health and other health disciplines. Critical appraisal of relevant research and contextualization of knowledge to be mobilized. Assessment and analysis of the knowledge: healthcare practice/policy gap, barriers and supports. Design of pragmatic knowledge to action strategy based on planned action models.

Course Component: Lecture

EPI 6581 Introduction à l'épidémiologie sociale (3 crédits)

Analyse de l'influence des forces sociales et du comportement humain sur le développement de la maladie. L'interaction entre le comportement et les systèmes physiologique et endocrinien, y compris le processus psychosomatique. Les indications pour l'intervention préventive par la modification du mode de vie.

Volet : Cours magistral

Préalable: Permission du responsable du programme.

EPI 6745 Introduction à l'application des connaissances issues de la recherche en santé (3 crédits)

Détermination des enjeux de pratique et de politique dans le domaine de la santé, notamment en épidémiologie et en santé publique. Évaluation critique de la recherche pertinente et mise en contexte des connaissances à mobiliser. Examen et analyse des connaissances : décalage entre les politiques et la pratique, obstacles et appuis en matière de soins de santé. Conception d'une stratégie visant à relier les connaissances pragmatiques à des actions, basée sur des modèles d'action planifiée.

Volet : Cours magistral

EPI 7101 Genetic Epidemiology (3 units)

Application of genetic biological methods to epidemiological research. Covers the development of research hypotheses; genetic determinants and gene-environment interactions; biomarkers for exposure and outcome as well as for predicting prognosis. Students will undertake a course project to design a genetic epidemiological study.

Course Component: Lecture

Prerequisite: EPI 5240

EPI 7102 Data Analysis Methods in Genetic Epidemiology (3 units)

Data analysis methods in genetic epidemiology and gene identification. Topics include the relationship between design and analysis; genetic models; methods for case-unrelated control studies, case-familial control studies and other familial designs; introduction to frequentist multiple testing and empirical Bayes methods, focus on applications to genome-wide association studies. Basic approaches in bioinformatics; insights into gene function based on the characterization of three major categories of cellular components (genome, transcriptome and proteome) and their interactions; public molecular databases. Practical lab sessions, both on statistical analysis and integration of discovery with information on gene function (commonly used algorithms; hands-on practice with data retrieval, manipulation and analysis).

Course Component: Lecture

Prerequisite: EPI 5242 or MAT 5375.

EPI 7103 Genetic Association Studies (3 units)

Population-based family studies, case-control and case-family control designs and analysis. Topics include population-based family studies; case-unrelated control design and variants; case-family control designs (including case-parent trios, e.g. maternal versus paternal versus fetal genetic effects; mitochondrial DNA; imprinting); genome-wide association; linkage disequilibrium; genotyping error; imputation; population stratification and methods for its control; genotyping errors; modeling haplotype variation; Hardy-Weinberg equilibrium; replication; selection of participants, rationale for choice of genes and variants; treatment effects in studying quantitative traits; relatedness of participants; reporting of descriptive and outcome data; issues of data volume; joint effects of genes and environmental factors; epistasis; bioinformatics; causal inference.

Course Component: Lecture

Prerequisite: EPI 5242 or MAT 5375.

EPI 7104 Advanced Methods in Biostatistics: Analysis of Variance (3 units)

Exploration of the theoretical foundations of the advanced methods in biostatistics as well as of the practical application and interpretation of these methods. Topics include repeated measures ANOVA; multivariate analysis of variance (MANOVA); split-plot ANOVA (SPANOVA); expected mean squares; randomization theory; estimation of variance using regression; tests of hypotheses for balanced and unbalanced data sets.

Course Component: Lecture

Prerequisite: EPI 5242 or MAT 5375.

EPI 7105 Advanced Methods in Biostatistics: Statistical Inference (3 units)

Advanced methods in biostatistics and probability modeling. Sample topics include: Bayesian parameter estimation; construction and use of likelihoods; hypothesis testing; comparison of inference methods using jackknife, bootstrap and normal approximations.

Course Component: Lecture

Prerequisite: EPI 5242 or MAT 5375.

EPI 7106 Qualitative Research Methods in Epidemiology (3 units)

Theoretical frameworks and corresponding methods of qualitative research applied to epidemiological research. Topics will include: theoretical paradigms of qualitative research; matching qualitative research to types of research questions; sampling objectives and procedures; methods of data collection; analysis and interpretation; quality criteria for evaluating qualitative research studies; ethical issues and responsibilities of qualitative researchers. Relationship between qualitative and quantitative research will be explored.

Course Component: Lecture

Prerequisite: EPI 5240

EPI 7107 Descriptive Epidemiology (3 units)

Issues of current debate in Descriptive Epidemiology and epidemiological methods. Topics will include methods for studying the distribution of health conditions and their predictors in populations, current issues and principles of disease classification and surveillance, surveillance of prognostic factors, applying principles of demography in epidemiologic research.

Course Component: Lecture

Prerequisite: EPI 5240

EPI 7108 Analytic Epidemiology (3 units)

Issues of current debate in Analytic Epidemiology and epidemiological methods. Topics will include theory and methods in the study of the etiology of health conditions and prognostic factors, current theories of disease causation, application of causal models to epidemiologic questions, implications for study design and analysis, measurement error.

Course Component: Lecture

Prerequisite: EPI 5240

EPI 7109 Clinical and Applied Epidemiology (3 units)

Issues of current debate in Clinical and Applied Epidemiology and epidemiological methods. Topics will include clinical health interventions related to individual patient care; research related to the design and delivery of broader health systems and services; current analytical methods and population-based studies; decision rules; randomized clinical trials; diagnostic tests; interventions that are relevant to public health practice.

Course Component: Lecture

Prerequisite: EPI 5240

EPI 7111 Biostatistics III (3 units)

Advanced methods in biostatistics, with emphasis on one or two major methods. Examination of the theoretical foundations of the methods as well as of their practical application and interpretation. Topics include multivariate statistics, longitudinal data analysis, multi-level models, and statistical genetics.

Course Component: Lecture

Prerequisite: EPI 5242 or MAT 5375.

EPI 7113 Special Topics in Epidemiology (3 units)

Variable topics depending on the interests of students and faculty.

Course Component: Lecture

EPI 7184 Health Policy (3 units)

Exploration of key issues relating to health policy within and outside Canada. Topics covered: rationale for public provision and funding of health care in Canada; historical and current perspectives regarding structure and process of the Canadian health care system; specific micro and macro policy issues relating to health and health care provision (Canadian and international).

Course Component: Lecture

EPI 7189 ADVANCED HEALTH ECONOMIC EVALUATION (3 units)

Advanced methods in health economic evaluation. Topics include, handling correlation, analyzing cost data, analyzing survival data, incorporating covariates and the need to calibrate, incorporating time dependent parameters, value of information analysis, deriving individual patient survival data from graphs and methods for individual patient simulation.

Course Component: Lecture

Prerequisite: EPI 5189.

EPI 7302 Observational Designs (1.5 unit)

Examination of the case-control method from conceptual, practical and analytical perspectives. Potential biases of different approaches. Role of nested case-control studies. Case-cohort, case-based, case-only and case-crossover designs. Implications of sampling methods for analytical approaches. Analysis of sample data sets, using SAS or STATA. The relationship between quantitative and qualitative research.

Course Component: Lecture

Prerequisite: EPI 5242.

EPI 7303 Translation of Genetic Discoveries from the Research Laboratory to the Health Care System (1.5 unit)

Overview of the process of transferring genetic discoveries into medicine and public health, focusing primarily on chronic diseases. Topics include basic concepts and existing knowledge translational pathways and frameworks. Interdisciplinary approaches to knowledge translation, including clinical trials, guideline development, dissemination research, outcomes research, and health policy research. Using chronic disease examples to illustrate the process, students will learn which elements need to be considered at each step in the translation process.

Course Component: Lecture

Prerequisite: EPI 5240

EPI 7501 Épidémiologie génétique (3 crédits)

Étude de l'application de méthodes de la biologie génétique à la recherche épidémiologique. Élaboration d'hypothèses de recherche; déterminants génétiques et interactions entre facteurs génétiques et environnementaux; utilisation de biomarqueurs pour la mesure d'une exposition et de son résultat ainsi que pour l'établissement d'un pronostic. Réalisation d'un projet d'étude d'épidémiologie génétique.

Volet : Cours magistral

Préalable: EPI 5240

EPI 7502 Méthodes d'analyse de données en épidémiologie génétique (3 crédits)

Aperçu de méthodes d'analyse des données en épidémiologie génétique et pour l'identification de gènes. Sujets abordés : relation entre protocole et analyse; modèles génétiques; méthodes d'études avec cas témoins non apparentés, d'études avec cas témoins appartenant à la famille, ainsi que d'autres protocoles familiaux; introduction aux tests multiples fréquentistes et aux méthodes bayésiennes empiriques, en mettant l'accent sur des applications à des études d'association pangénomique. Méthodes de base de la bioinformatique; aperçu de la fonction des gènes à partir de la caractérisation de trois catégories principales de composantes cellulaires (génomique, transcriptome et protéome) et de leurs interactions; bases de données moléculaires publiques. Séances pratiques de laboratoire, tant sur l'analyse statistique que sur l'intégration de découvertes et de l'information sur la fonction de gènes (algorithmes communément utilisés; travaux pratiques d'extraction, de traitement et d'analyse de données).

Volet : Cours magistral

Préalable : EPI 5642 ou MAT 5775.

EPI 7503 Études d'association en génétique (3 crédits)

Examen approfondi d'études familiales de population, d'études cas témoins et de protocoles avec cas témoins appartenant à la famille, ainsi que de l'analyse des données correspondantes. Sujets abordés : études familiales de population; protocoles avec cas témoins non apparentés et leurs variantes; protocoles avec cas témoins appartenant à la famille (dont des trios formés d'un sujet et de ses parents, p. ex. effets génétiques maternels, paternels et f taux; ADN mitochondrial; empreinte); études d'association pangénomique; déséquilibre de liaison; imputation; stratification d'une population et méthodes de contrôle de la stratification; erreurs de génotypage; modélisation des variantes d'un haplotype; équilibre de Hardy-Weinberg; réplification; sélection de participants, justification du choix de gènes et de variantes; effets d'un traitement sur l'étude de traits quantitatifs; liens entre participants; compte rendu de données descriptives et de résultats; problèmes liés à la quantité de données; effets conjoints de facteurs génétiques et environnementaux; épistasie; bioinformatique; inférence causale.

Volet : Cours magistral

Préalable: EPI 5642

EPI 7504 Méthodes avancées de biostatistique : Analyse de variance (3 crédits)

Exploration des fondements théoriques des méthodes avancées de biostatistique ainsi que des applications pratiques et de l'interprétation de ces méthodes. Sujets abordés : analyse de la variance de mesures répétées; analyse de variance multidimensionnelle; analyse de variance avec subdivision de parcelles; valeurs quadratiques moyennes prévues; théorie de randomisation; estimation de la variance à l'aide d'une régression; tests d'hypothèses sur des jeux de données équilibrés et non équilibrés.

Volet : Cours magistral

Préalable: EPI 5642

EPI 7505 Méthodes avancées de biostatistique : Inférence statistique (3 crédits)

Méthodes avancées de biostatistique et de modélisation probabiliste. Exemples de sujets abordés : estimation bayésienne de paramètres; construction et utilisation de vraisemblances; tests d'hypothèses; comparaison de méthodes d'inférence à l'aide de la technique du ré-échantillonnage jackknife, d'une amorce et d'approximations normales.

Volet : Cours magistral

Préalable: EPI 5642

EPI 7506 Méthodes de recherche qualitative en épidémiologie (3 crédits)

Cadres théoriques et méthodes correspondantes de recherche qualitative appliquées à la recherche en épidémiologie. Sujets abordés : paradigmes théoriques de la recherche qualitative; recherche qualitative adaptée à divers types de questions; objectifs et procédures d'échantillonnage; méthodes de collecte, d'analyse et d'interprétation de données; critères de qualité pour l'évaluation d'une recherche qualitative; questions d'éthique et responsabilités des chercheurs en matière de recherche qualitative. Relations entre recherche qualitative et recherche quantitative.

Volet : Cours magistral

Préalable: EPI 5240

EPI 7507 Épidémiologie descriptive (3 crédits)

Questions actuellement débattues en épidémiologie descriptive et à propos des méthodes de l'épidémiologie. Sujets abordés : méthodes d'étude de la répartition de diverses affections et de leurs prédicteurs dans une population; problèmes actuels et principes de la classification et de la surveillance des maladies; surveillance de facteurs de pronostic; applications des principes de la démographie à la recherche en épidémiologie. Préalable : EPI 5240 ou l'équivalent.

Volet : Cours magistral

Préalable: EPI 5240

EPI 7508 Épidémiologie analytique (3 crédits)

Questions actuellement débattues en épidémiologie analytique et à propos des méthodes de l'épidémiologie. Sujets abordés : théorie et méthodes de l'étude de l'étiologie des affections et de leurs facteurs de pronostic; théories actuelles sur les causes des maladies; application de modèles de causalité à des questions d'épidémiologie; conséquences sur la conception de protocoles, l'analyse de données et les erreurs de mesure.

Volet : Cours magistral

Préalable: EPI 5240

EPI 7509 Épidémiologie clinique et appliquée (3 crédits)

Questions actuellement débattues en épidémiologie clinique et appliquée, ainsi qu'à propos des méthodes de l'épidémiologie. Sujets abordés : interventions cliniques liées aux soins aux patients particuliers; recherche liée à la conception et à la prestation de systèmes et services élargis de soins de santé; méthodes analytiques actuelles et études de population; règles de décision; essais cliniques aléatoires; tests diagnostiques; interventions pertinentes en matière de santé publique.

Volet : Cours magistral

Préalable: EPI 5240

EPI 7511 Biostatistique III (3 crédits)

Méthodes avancées de biostatistique, avec accent sur une ou deux méthodes importantes. Examen des fondements théoriques de ces méthodes ainsi que de leurs applications pratiques et de leur interprétation. Sujets abordés : statistiques multidimensionnelles, analyse de données longitudinales, modèles multi-niveaux, génétique statistique.

Volet : Cours magistral

Préalable : EPI 5642.

EPI 7513 Sujets particuliers en épidémiologie (3 crédits)

Divers sujets choisis en fonction des intérêts des étudiants et du professeur.

Volet : Cours magistral

EPI 7702 Études d'observation (1.5 crédit)

Examen de la méthode des cas témoins sur les plans conceptuel, pratique et analytique. Biais potentiel de différentes approches. Rôle d'études cas témoins imbriquées. Étude cas-cohorte, étude avec l'échantillonnage liée aux cas, protocole limité aux cas et protocole croisé. Conséquences des méthodes d'échantillonnage sur les méthodes d'analyse. Analyse d'échantillons de données à l'aide de SAS ou de STATA. Relations entre recherche qualitative et recherche quantitative.

Volet : Cours magistral

Préalable: EPI 5642

EPI 7703 Les découvertes en génétique: du laboratoire de recherche au système de soins de santé (1.5 crédit)

Aperçu du processus de transfert des découvertes en génétique vers les domaines de la médecine et de la santé publique, en mettant principalement l'accent sur les maladies chroniques. Sujets abordés : voies et cadres de transfert de notions fondamentales et de connaissances existantes. Approches multidisciplinaires du transfert de connaissances : essais cliniques, élaboration de lignes directrices, recherche en matière de transmission, d'évolution et de politiques de santé. À partir d'exemples portant sur des maladies chroniques, les étudiants apprendront quels éléments doivent être pris en considération à chaque étape du processus de transfert de connaissances. Préalable : EPI 5240 ou l'équivalent.

Volet : Cours magistral

Préalable: EPI 5240.

EPI 7910 Études dirigées en épidémiologie / Directed Studies in Epidemiology (3 crédits / 3 units)

Étude approfondie d'un sujet d'intérêt particulier pour l'étudiant, sous la direction d'un professeur membre du programme. Préalable : EPI 5240 ou l'équivalent et approbation du Comité des études doctorales. / Directed Studies on a topic of individual interest to the student under the direction of a faculty supervisor. Students planning to take this course must have the proposed content, learning activities and evaluation methods approved by the Doctoral Studies Committee. Prerequisite: EPI 5240 or equivalent.

Volet / Course Component: Cours magistral / Lecture

Préalable : EPI 5240 / Prerequisite: EPI 5240

EPI 7912 Études dirigées en biostatistique / Directed Studies in Biostatistics (3 crédits / 3 units)

Étude approfondie d'un sujet en biostatistique d'intérêt particulier pour l'étudiant, sous la direction d'un professeur membre du programme. / In-depth study on a topic in biostatistics of individual interest to the student under the direction of a faculty member in the program.

Volet / Course Component: Cours magistral / Lecture

Préalable : EPI 5642 ou MAT 5775. / Prerequisite: EPI 5242 or MAT 5375.

EPI 7913 Thèmes spéciaux en épidémiologie / Special Topics in Epidemiology (3 crédits / 3 units)

Sujets variables selon les intérêts des étudiants et du corps professoral. / Variable topics depending on the interests of students and faculty.

Volet / Course Component: Cours magistral / Lecture

EPI 7980 Stage / Internship

Expérience pratique et exécution d'un projet ayant trait à l'évaluation des technologies de la santé dans un organisme de recherche ou une agence d'évaluation des technologies de la santé, sous la supervision d'un membre du corps professoral. Noté S (satisfaisant) ou NS (non satisfaisant) à partir d'un rapport de stage écrit et des résultats du stage. / Practical experience and completion of a project related to HTA in a research organization or an HTA agency, under the supervision of a faculty member. Graded S (Satisfactory) / NS (Not satisfactory) based on a written report on the project, and on performance during the internship.

Volet / Course Component: Cours magistral / Lecture

EPI 7998 Mémoire / Research Paper (6 crédits / 6 units)

Mémoire préparé sous la direction d'un ou deux membres du corps professoral choisis en accord avec la personne responsable des études supérieures. Le mémoire est évalué par le ou les personnes qui l'ont dirigé et un autre membre du corps professoral. Noté S (satisfaisant) / NS (non satisfaisant). / Research paper prepared under the direction of one or two professors chosen in consultation with the director of graduate studies. The paper is evaluated by the (co-)advisor(s) and another professor. Graded S (Satisfactory) / NS (Not satisfactory).

Volet / Course Component: Recherche / Research

EPI 8166 Ph.D. Seminar (3 units)

Presentation of one seminar as well as regular attendance at the departmental seminar series. Offered over two consecutive sessions. Compulsory for all students enrolled in the doctoral program in Epidemiology. Graded S (Satisfactory) / NS (Not satisfactory).

Course Component: Seminar

EPI 8566 Séminaire de doctorat (3 crédits)

Présentation d'un exposé et participation régulière aux séances de séminaire du département. Offert sur deux sessions consécutives. Obligatoire pour tous les étudiants inscrits au programme de doctorat en épidémiologie. Noté S (satisfaisant) ou NS (non satisfaisant).

Volet : Cours magistral

EPI 9997 Projet de thèse / Thesis Proposal

Volet / Course Component: Recherche / Research

EPI 9998 Examen de synthèse / Comprehensive Examination

Volet / Course Component: Recherche / Research