The perspective will demonstrate that each disease is the result of an evolving interplay of genetic and environmental factors. (Jointly with PATH 430. Additional work prescribed for graduate students.) Half-course, lectures and seminars; Winter term. D. Lillicrap.

**PATH 827 Research Project in Pathology**
Research projects in the physiological, biological, genetic and molecular basis of disease. Students will review the literature related to their proposed graduate research thesis project and write a series of essays on topics selected in consultation with a supervisory committee consisting of their supervisor and two other faculty. They will also develop a written draft research proposal that will be presented to their supervisory committee and defended in a final oral examination. To be taken by all students in the first full term of the graduate program. P. Greer (course coordinator).

**PATH 828 Bioinformatics for Cancer Research**
Bioinformatics is an essential component of biological and health science research given the ongoing developments in generating large amounts of data in short periods of time. This course introduces tools and methods to manage and analyze the results obtained in cancer research. Topics include study design, basic statistics for clinical and genetic research, data-mining approaches and alternative methods to statistics for data analysis, and signaling pathways analysis. The course will cover the appropriate pre-processing and data analysis techniques for various genetic data types such as microarray, tissue microarrays, methylation, NanoString, RNAseq, miRNAseq, proteomics and qRT-PCR. Students with little computing background, but who are interested in pursuing or collaborating with bioinformatic research, are encouraged to enroll.

**PATH 830 (MSc)**
**PATH 930 (PhD) Pathology and Molecular Medicine Research Seminar Series**
This seminar series consists of weekly presentations by visiting external speakers, Queen's faculty, and Departmental MSc and PhD students. Internal faculty and external visiting speakers will be selected by the Graduate Program coordinator with input from faculty and students. MSc students will give 1/2 hour seminars in their first year, and one hour seminars in their second year; PhD students will give 1 hour seminars in their first and third years.
years, and an exit seminar in their final year. Attendance by all Departmental graduate students is compulsory and will be monitored by the Graduate Program Coordinator. Departmental faculty will provide evaluations of student presentations consisting of a mark and written comments relating to introduction and background, presentation of results and response to questions. A final mark and summary of faculty evaluations will be compiled by the coordinator and provided to the student and supervisor. Students are required to provide a written summary outlining their research progress to their supervisory committee five days prior to their seminar. Fall/Winter terms. P. Greer

PATH 899 Master’s Thesis Research

PATH 999 Ph.D. Thesis Research