

<http://www.geo.ucalgary.ca/hydro/courses/index.htm#ENSC401>

Undergraduate Courses

Environmental Science 401 *Environmental Science Field Course I*

Working in environmental systems, students will be introduced to methods of identifying components of ecosystems, surveying plant and animal communities, and for making quantitative assessments of these communities. The course will be held at the Kananaskis Field Station two weeks immediately prior to the commencement of the Fall Session. During the Fall Session, participants in the course will meet for three hours per week to process field data and to continue discussions on ecological methods and on aspects of biodiversity (particularly in W. Canada).

Note: Open only to students in the Environmental Science Program, or by consent of the Program Director.

Environmental Science 501 *Environmental Science Field Course II*

The focus will be on disturbances to aquatic and terrestrial ecosystems. Day-length visits will be conducted to appropriate areas that have either undergone or are undergoing severe disturbance (e.g., forest clearcutting, water pollution, open pit mining, etc.). Discussion of potential reclamation strategies will take into consideration a range of impacts (e.g., sociological, economic, chemical, ecological, etc.) of each strategy.

Note: Open only to students in the Environmental Science Program, or by consent of the Program Director.

Environmental Science 502 *Special Problems in Environmental Management*

Briefly surveys many aspects of the professional practice of environmental science including: environmental management, audit and accounting, law and regulation, life cycle assessment, ethics and philosophy, toxicology and epidemiology, hazardous waste management and remediation and reclamation technologies. Includes a major collaborative research project.

Note: Open only to students in the Environmental Science Program, or by consent of the Program Director.

Geography 415 *Hydrology*

The physical basis of water utilization and management. Elements of the hydrologic cycle - precipitation, ground water and stream flow. Techniques for estimating water yield and renewal potential in drainage basins.

Prerequisites: Geography 305 or 307, and 339 (or a course in Statistics by consent of the Department).

Geography 515 *Applied Hydrology*

Dam and reservoir water management, irrigation forms, stream routing and flood control, municipal water supply, well development and water conservation. Canadian water resources are emphasized.

Prerequisite: Geography 415 or an equivalent course in Engineering by consent of the Department.

Geology 401 *Physical Hydrogeology*

Hydrologic cycle, conservation principle, Darcy's Law, groundwater flow systems, aquifer testing, soil hydrology, effective stress, land subsidence and solute transport.

Prerequisites: Geology 201 or 209 or 271; Physics 213 or 223 or Engineering 249; and Mathematics 253 or Applied Mathematics 219.

Note: Credit for both Geology 401 and 601 will not be allowed.

Note: Completion of Geology 373 is highly recommended prior to taking this course.

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Geology 429 *Geochemical Thermodynamics*

Application of chemical thermodynamics to problems in igneous, metamorphic and sedimentary geology, and aqueous geochemistry. Using thermodynamic computations to construct and interpret pressure-temperature diagrams, log (activity) diagrams and equilibrium constants and activity products. Other topics as time permits.

Prerequisites: Chemistry 201, 203; Geology 311, 313; Mathematics 221; Mathematics 253 or Applied Mathematics 219; Physics 211 or 221, and 223.

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Geology 441 *Field Techniques in Hydrogeology*

The course entails a week at a hydrogeology field site on the Fraser River delta, British Columbia. Hydrogeology and geotechnical techniques will be demonstrated and will involve hands-on participation by students. After the field work, students will conduct extensive analysis and interpretation of data gathered during the field session, complete exercises and prepare a written report. The course normally runs for about three weeks following Winter Session final examinations.

Prerequisites: Geology 401 and consent of the Department.

Note: Credit for both Geology 441 and 639 will not be allowed.

Note: This course has limited enrollment and priority will be given to Applied and Environmental Geology majors. Students are normally required to cover food and accommodation costs.

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Geology 503 *Aqueous Geochemistry*

Theoretical and applied aspects of aqueous solution chemistry. Topics include: methods for collection and preservation of water samples in the field, laboratory analysis of water, theory and application of aqueous thermochemical models.

Prerequisite: Geology 329 or 429.

Note: A weekend field excursion will be run in September.

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Geology 505 *Contaminant Hydrogeology*

Chemical and biological processes in surface water and groundwater systems. Topics include: water quality, contaminant transport and dispersal, fluid-sediment interactions, remediation of contamination. Techniques will include the use of thermochemical models, numerical modelling of contaminant migration, and examination of case studies.

Prerequisites: Geology 403 or 503 and one of 401, 501, or 601.

Geology 510 Senior Thesis

A written report based on independent study. Originality is emphasized, laboratory and field studies are encouraged. Published material may be included.

Prerequisites: Consent of the Department and of a departmental faculty member who will act as a supervisor.

Note: May be repeated for credit.

Geology 571 Engineering Geology

Application of geology to engineering problems with emphasis on the geologic aspects of site and environmental investigations. Characterization of rock masses and surficial deposits and examination of their behaviour; special mapping methods, air photo interpretation and the application of some geophysical techniques.

Prerequisites: Geology 341 and Geophysics 355.

Note: Completion of Geology 401 is highly recommended prior to taking this course. Students who have not completed Geology 401 are advised to attend the tutorial session of Geology 571, offered during January block week.

Geology 597 Numerical Models and Geostatistics

Analysis of numerical geological data, estimation and hypothesis testing, application of multivariate techniques in geology. Introductory geostatistics.

Prerequisites: Geology 341; Mathematics 253 or Applied Mathematics 219; Mathematics 221; or consent of the Department.

Note: Completion of Mathematics 331 and/or Statistics 357 is highly recommended prior to taking this course.