



UNIVERSITY OF NEW BRUNSWICK  
FREDERICTON CAMPUS

## GRADUATE STUDIES DEPARTMENT OF CIVIL ENGINEERING

### PROGRAMS OF STUDY

The Department of Civil Engineering offers research-based programs of study leading to the degrees of Master of Engineering (MEng), Master of Engineering (Environmental Studies) (MEng), Master of Science in Engineering (MScE), and Doctor of Philosophy (PhD) in Civil Engineering. The normal duration for the MEng or MScE program is 24 months. The normal duration for the PhD program is 36 months.

#### **MEng**

Candidates for the MEng degree must complete a minimum of 24 credit hours of course work (see calendar for credit hour allocation), and a Report on a significant aspect of engineering in the area of specialization. The MEng degree has no residency requirement and it may be taken on a part-time basis. Students must have a BScE in Civil Engineering or a related engineering degree to enter the program.

#### **MEng (Environmental Studies)**

Details of this multi-disciplinary program are available at <http://www.ee.unb.ca/powereng/archive/MEng/MEng.htm>. This program, as well as the regular MEng program, is primarily course-based, with a report on an acceptable project. The degree requirements for the MEng (Environmental Studies) are the same as those for the regular MEng program, as given above.

#### **MScE**

The MScE is a research-oriented degree for which a thesis is required. The program requires a minimum of 15 credit hours of course work (see calendar for credit hour allocation), and a minimum residency requirement of one academic year. Each student, in conference with a faculty advisor, selects courses suited to the appropriate area(s) of specialization. Students whose undergraduate degree is in a field other than the intended graduate program may be required to take additional courses as background material or as prerequisites. Students are encouraged to take suitable courses in mathematics and other relevant fields of engineering when possible.

#### **PhD**

The PhD is a research-oriented degree for which a thesis on original and significant research in the field of Civil Engineering is a major requirement. A candidate with a suitable graduate degree is normally required to take a minimum of 12 credit hours of course work and a residency requirement of two academic years. Candidates are normally required to have a graduate degree in engineering or applied science. To qualify for the PhD degree, a student must maintain a superior grade point average and obtain a passing grade on a comprehensive examination administered within the first 12 months. Acceptability and suitability are determined by the candidate's PhD Comprehensive Examination Committee.

### AREAS OF SPECIALIZATION:

- Construction Engineering and Management
- Geotechnical and Geoenvironmental Engineering
- Highway and Pavement Research
- Materials and Infrastructure Renewal
- Structural Engineering
- Transportation and Planning
- Water and Environmental Engineering

### RESEARCH FACILITIES

The Graduate Program in Civil Engineering has the use of extensive library, modern computers and well-equipped laboratory facilities for research in field and laboratory investigations of soils, for laboratory study of various engineering materials, for the field testing and long-term monitoring of pavement performance, for field measurements of highway traffic characteristics, for field sampling and laboratory measurement of water quality, for testing of structures under both static and fatigue loads, for studying flow of water and air, and for many other projects. In addition, the transportation group has a modernly equipped vehicle for road testing and maintains an accident investigation team. The construction engineering and management group maintains close ties with industry through joint research projects.

## RECENT RESEARCH

- transportation planning
- impacts of heavy vehicles on pavements
- rutting in asphalt pavements
- geotechnics of unusual soils and fills
- suspended sediment transport
- hydraulics of water flow under ice
- groundwater studies
- biological wastewater treatment
- drinking water treatment
- biological reactor model studies
- solid waste management
- highway de-icers and asphalt pavements
- strength and behaviour of structures and structural components
- soil-structure interaction
- centrifuge modelling
- progressive project management methods and approaches
- information technology for the architectural, engineering and construction (AEC) industry
- innovation and technology adoption in the AEC industry
- durability of concrete in marine environment
- strength of lightweight concrete
- permeability of concrete
- epoxy coated reinforcing bars in marine concrete
- lignosulphonic admixtures for concrete

## CURRENT RESEARCH

**CONSTRUCTION** - eBusiness in the AEC industry, Knowledge Management in the AEC industry, Interoperability of AEC Project Management Tools, Productivity in the Construction Industry, Technology Adoption in the AEC industry, Infrastructure and Facilities Management, Life-Cycle Costs, Risk Management, Constructability.

**GEOTECHNICAL** - Centrifuge modelling of soil-structure interaction, prototype structure instrumentation and monitoring, clay liner testing using mini-centrifuge, pile driveability analysis, and Geotechnical properties of lightweight materials.

**MATERIALS** - Durability of Concrete in Marine Environment, Corrosion of Steel in Concrete, Strength of Lightweight Concrete, Freeze-thaw Resistance of Concrete, Fiber Reinforced Concrete, Behaviour of Concrete at High Temperature, Effect of Supplementary Cementing Materials on the Performance of Concrete, Microstructural and Microchemical Analysis of Concrete using SEM and EDXA.

**MUNICIPAL PLANNING AND ENGINEERING** - Urban, Rural, and Regional Planning, Public Works and Administration, Retail Distribution, Municipal Systems, Local Government Systems.

**PAVEMENTS** - Performance of Concrete Paver Pavement Systems, Instrumentation of Pavement Systems under Dynamic Loading, Asphalt Rubber Pavement Performance, Pavement Rehabilitation Options.

**STRUCTURES** - Strength and Behaviour of Steel Members and Connections, Properties and Behaviour of Masonry Structures, Computer Analysis of Steel and Concrete Structures, Dynamics of Structures, Marine Structures, Structure-soil-foundation Interaction Studies, Strength and Behaviour of Concrete Structures, Response of Structure to Impact Loading.

**TRANSPORTATION AND PLANNING** - Intermodal Passenger and Freight Transportation Systems; Transport Systems Analysis; Transport Management, Policy and Economics; Road, Air and Marine Facility Planning and Design; Physical Distribution; Regulatory Reform of the Transportation Industry.

**WATER AND ENVIRONMENTAL ENGINEERING** - Hydrology; water supply; contaminant fate and transport in surface water, soil and groundwater; environmental hydraulics; water quality management; numerical modelling of groundwater and surface water quality; contaminated soils and aquatic sediments; biological and physico-chemical wastewater treatment; solid waste and hazardous waste management; biosolids treatment and environmental engineering design.

Equipment available for water and environmental research includes: acoustic Doppler velocity meter; portable and programmable Hobo weather station; portable flumes; field water quality meters (pH, DO, salinity, conductivity, etc.); turbidity meter; hydrometric gauging stations; and data loggers. The Department of Civil Engineering has modern environmental laboratory equipment including: GC (FID/TCD); ICP-OES; UV-spectrophotometer; imaging software with microscope; environmental respirometer system; total organic carbon analyzer; and walk-in environmental chamber. The hydraulics and sediment dynamics research laboratories are equipped with: three large flumes for ecohydraulics studies; lab-scale acoustic Doppler velocity meters; Malvern particle sizing instrumentation; and a highspeed video camera. The water quality modeling laboratory is equipped with three workstations and software such as FEFLOW, Visual MODFLOW, TecPlot, CORMIX, ArcView, and research models developed at UNB.

Visit our Home Page for further information on the Department of Civil Engineering at the University of New Brunswick at: <http://www.unb.ca/civil/>

## LIST OF COSTS FOR STUDENTS

Students are responsible to pay for the following costs:

- Tuition (3 terms per year)
- Differential Fee – (International Students only)
- Health Benefits – (optional for some students)
- Text Books
- Course Related Materials
- Technology Fee
- Graduate Student Association Fee
- Living Expenses
- Facilities Improvement Fee

**GRADUATE STUDENT FEE SCHEDULE:** <http://www.unb.ca/financialservices/students/tuitionandfees/fredericton.html>

## FINANCIAL AID

Financial assistance is available on a competitive basis to students through research grants, research contracts, graduate research assistantships, graduate teaching assistantships, and various scholarships. Application decisions and funding decisions are considered separately. Financial assistance will only be considered if you are accepted into the program by the School of Graduate Studies. These decisions are made on a competitive basis and are highly dependent upon the availability of funds at the time.

## LOCATION

The University of New Brunswick campus has a beautiful hillside setting overlooking Fredericton, the City of Stately Elms, so-called because of the capital city's abundance of majestic elms which tower above its many historic structures. Centrally located, the city is within easy reach of major cities such as Montreal and Boston, USA. The area is replete with facilities for summer and winter outdoor sports and features a playhouse, a world class art gallery, restaurants, and beautiful year round scenery along the shores of the majestic St. John River.

## THE UNIVERSITY

Originally called the Provincial Academy, it was transformed into the College of New Brunswick in 1800 and in 1829 was subsequently transformed into King's College. King's College became the University of New Brunswick in 1859.

In 1854, 26 students enrolled in the first civil engineering course offered by King's College which later became the University of New Brunswick. It was the first engineering course offered by any British North American university. The course promised to be "immediately and practically useful in enabling a boy to earn his own bread." The first master's degree was awarded in 1907. In the 1940's, there was considerable growth in engineering at UNB. In 1946, the Faculty of Engineering was established and one year later, UNB graduated its first female engineer.

The first engineering building was opened in 1901 and in 1957, a former gymnasium was renovated and connected to the Engineering Building. Two years later, it accommodated UNB's first computer. A decade later, a large new wing was built and the entire engineering complex was renamed Sir Edmund Head Hall. Additional facilities are now available as another addition to Head Hall, the Gillin Hall, was opened in 1989.

## PRELIMINARY APPLICATION DEADLINES

There are no set deadlines for receipt of applications. Preliminary application forms are processed as they are received.

**Department of Civil Engineering  
University of New Brunswick  
PO Box 4400 - Fredericton - New Brunswick – CANADA - E3B 5A3**

Telephone: (506) 452-6127

Fax: (506) 453-3568

E-mail: civil-grad@unb.ca

**PRELIMINARY APPLICATION ASSESSMENT FOR GRADUATE STUDIES**

Thank you for your interest in graduate studies with the Department of Civil Engineering at the University of New Brunswick, Fredericton campus. The qualification requirements for our program are included below. Please note that these are the minimum requirements for acceptance and that the spaces available are filled on a competitive basis. The start dates for our graduate programs are **September (Fall Term)** and **January (Winter Term)** of each year.

**We have a two-stage application process: 1) Preliminary Application, and 2) Official Application**

1) The **Preliminary Application** is to be submitted to the **Department of Civil Engineering** for evaluation. There is no fee for this stage of the application process. In order to help assess the suitability of our program for you (and vice versa), this form and all additional required documents should be submitted to the address above by mail or fax. If you are requesting financial assistance, please indicate this in on the application form. There are no further application forms for financial assistance required. If you have not completed your current degree program, please indicate the date you expect to graduate.

- For International applicants whose mother tongue is not English, demonstration of a sufficiently good command of the English Language to enable them to fully participate in the academic life of the University is required. (See the University of New Brunswick “English Language Proficiency” document, included with this package). **Please note, however, that this Department has exceptions to this Policy, one of which is: The minimum acceptable TOEFL score is 580 (not 550) for the paper based test, or 237 (not 213) for the computer based test or 92% for internet-based. Applications with test scores below these grades will not be considered.**
- If a copy of your transcript(s) and English Test Results, including the Test of Written English, are not included with your Preliminary Application, it will held in a file for receipt of those documents. They are required by the University and acceptances cannot be considered without them. **We encourage you to include a copy of your GRE results if you have completed that exam.** Information about the examination may be obtained from Educational Testing Service, Box 955, Princeton, New Jersey, 08540, U.S.A.
- For graduates of the University of New Brunswick, the normal minimum requirement for admission as a regular graduate student is an Honours Bachelor’s degree (or a similar program with intensive specialization in an appropriate discipline) with a Cumulative Grade Point Average of at least 3.0. The same level of degree with at least a “B” average (North American System) or upper second class standing (British System) is normally required for graduates of other universities. (A guideline for a “B” average is a cumulative grade between 71% and 75%.)

Upon receipt of all the required documentation, the Preliminary Application will be evaluated by the appropriate faculty members in this Department.

2) If your qualifications seem appropriate, and if there is space available in our program at that time, you will be informed, normally by e-mail, and invited to proceed with the Official Application stage. Details for this application process will be included with the Official Application. At this second stage, it is necessary that all documentation submitted be “official” documents. Upon completion of the Official Application, it should be sent directly to:

**School of Graduate Studies  
University of New Brunswick - Sir Howard Douglas Hall  
Room 317 - 3 Bailey Drive - PO Box 4400  
Fredericton - New Brunswick - Canada - E3B 5A3**

## ENGLISH LANGUAGE PROFICIENCY

### School of Graduate Studies University of New Brunswick

“Additional Requirements for International Applicants”- School of Graduate Studies - University of New Brunswick  
see website: <http://www.unb.ca/gradstudies/admissions/international.html>  
*\*(revised by Graduate Academic Unit of Civil Engineering, Feb 2007).*

English is both the working language and the primary language of instruction and examination at UNB. Hence it is essential that all students be able to communicate and comprehend effectively, both orally and in written form, in English. All international applicants to the School of Graduate Studies whose mother tongue is not English are required to demonstrate that they have a sufficiently good command of the English language to enable them to participate fully in the academic life of the University. This includes International applicants who are Landed Immigrants or reside in Canada. Proficiency in English **MUST** be demonstrated by one of the means listed below. **This proficiency requirement will NOT be waived.** The School of Graduate Studies will not issue the final “Certificate of Acceptance” until the English proficiency requirement is met.

The normal method for demonstrating English competence is through completion of the paper-based test of English as a Foreign Language - **TOEFL** (minimum score of ~~550~~ **580\***), including the Test of Written English - **TWE** (minimum score **4.0**). A computer based TOEFL (minimum score of ~~213~~ **237\***) including the Test of Written English - TWE (minimum score 4.0) and the internet-based (minimum score of **92%\***). Information concerning the TOEFL & TWE is available at United States embassies and consulates, Offices of the U.S. Information Service, or directly from Test of Written English as a Foreign Language, Box 899, Princeton, NJ 08540, USA, or the web site: <http://www.toefl.org>.

Proficiency in English may also be demonstrated through completion of one of the following tests, and must include any written components of that test battery:

- the British Council English Language Test – **IELTS** (minimum score of band ~~7~~ **7.5\***);
- the Michigan English Language Assessment Battery – **MELAB** (minimum score of 85); or
- the Canadian Test of English for Scholars and Trainees – **CanTest** (minimum score of band 4.5).

#### PLEASE NOTE:

- Our Graduate Academic Unit (GAU) requires a higher standard on these tests than the ones indicated as the minimum for the School of Graduate Studies (SGS) (noted above\*).
- A photocopy of the test scores for preliminary consideration may be submitted with your application until the official scores are received directly from the testing agency –and sent directly from the agency to SGS. The SGS’ institution code is 0976 and Civil Engineering department code is 65.
- Applications will be regarded as incomplete without test scores.
- If the School of Graduate Studies determines subsequent to admission that an individual’s actual proficiency in English is not adequate, the student may be required to take a standardized English proficiency test at UNB and/or enrol in and successfully complete a UNB English language course(s) [ENGL 6021 &/or 6022, or equivalent] in order to maintain registration in the Graduate School.
- TSE scores are valid for two years from the test date. Because language proficiency can change considerably in relatively short period of time, scores more than two years old cannot be reported or verified. If you took the TSE test more than two years ago and need to submit scores to an agency or institution, you must take the test again to have your scores reported.