
UNIVERSITY OF NEW BRUNSWICK
NEW BRUNSWICK MATHEMATICS COMPETITION

PROGRAM

FRIDAY, MAY 8, 2009

- 10:15 a.m.** Students begin to assemble at designated rooms
- Grade 7:** HC13, Head Hall Auditorium
Grade 8: T102, Tilley Hall Auditorium
Grade 9: TO3, Toole Hall Auditorium
*** Please note change of Auditorium for Grade 9 ***
- 10:50 a.m. – 11:50 a.m.** Competition
*** We will attempt to start 10 minutes before 11:00 am ***
Teachers and chaperones will be hosted in the lounge of the Alumni Memorial Building
- 12:00 – 1:00 p.m.** Lunch
- For exactly **\$7.00** you can get an all-you-care-to-eat lunch at the dining room in McConnell Hall.
*** We guarantee that lines will be shorter than last year! ***
- Tim Horton's and the Campus Shoppe will also be open in the Student Union Building (SUB).
- 1:10 – 3:15 p.m.** Optional Activities (see schedule)
- 3:30 – 4:00 p.m.** Presentation of Awards at the Main Gym, Lady Beaverbrook Gym

School buses should park south of (uphill from) Marshall D'Avray Hall at Aitken Centre

We gratefully acknowledge the financial support of the Minister of Education, CIBC Wood Gundy, Morneau Sobeco and the Natural Sciences and Engineering Research Council (NSERC) Representatives Program.

Optional Activities – Friday May 8, 2009

1:10 – 1:40	2:00 – 2:30	2:45 – 3:15
Art Centre Assemble – Main Lobby of Memorial Hall Capacity: 12 students per session	Art Centre Assemble – Main Lobby of Memorial Hall Capacity: 12 students per session	Mechanical Engineering Assemble – Main Lobby of Head Hall Capacity: 15 students
Biomedical Engineering Motion Analysis Assemble – Main Lobby of R.N. Scott Hall (down the hill from the bookstore, Biomedical Engineering Bldg.) Capacity: 15 students per session	Biomedical Engineering Motion Analysis Assemble – Main Lobby of R.N. Scott Hall (down the hill from the bookstore, Biomedical Engineering Bldg.) Capacity: 15 students per session	Biomedical Engineering Motion Analysis Assemble – Main Lobby of R.N. Scott Hall (down the hill from the bookstore, Biomedical Engineering Bldg.) Capacity: 15 students per session
Business Administration Millionaires’ Club Assemble – Main Lobby of Tilley Hall Capacity: 20 students	Computer Science Video Game Programming Demo Assemble – Main Lobby of Head Hall Capacity: 35 students per session	Computer Science Video Game Programming Demo Assemble – Main Lobby of Head Hall Capacity: 35 students per session
Chemistry Why am I still driving a gas guzzler? Assemble – Room 42 of Toole Hall (Follow the signs) Capacity: 15 students	Chemistry Why am I still driving a gas guzzler? Assemble – Room 42 of Toole Hall (Follow the signs) Capacity: 15 students	Chemistry Why am I still driving a gas guzzler? Assemble – Room 42 of Toole Hall (Follow the signs) Capacity: 15 students
Chemical Engineering Cold rolling of copper Assemble – Main Lobby of Head Hall Capacity: 15 students	History A harmless old woman or a secret agent of Satan? T102, Tilley Hall Auditorium Capacity: 250+ students	Forestry New Forestry, Back Entrance Basement - Room 013/015 Capacity: 30 students
Electrical & Computer Engineering Fun with Electricity Assemble – Main Lobby of Head Hall Capacity: 24 students per session	Electrical & Computer Engineering Fun with Electricity Assemble – Main Lobby of Head Hall Capacity: 24 students per session	Mechanical Engineering Magnetic Levitation and Mechatronics Assemble – Main Lobby of Head Hall Capacity: 30 students
Geodesy & Geomatics Engineering On mice and bats Assemble – Main Lobby of Head Hall Capacity: 20 students per session	Geodesy & Geomatics Engineering On mice and bats Assemble – Main Lobby of Head Hall Capacity: 20 students per session	Geodesy & Geomatics Engineering On mice and bats Assemble – Main Lobby of Head Hall Capacity: 20 students per session
Civil Engineering SIM sewer Assemble – Main Lobby of Head Hall Capacity: 15 students	Economics Assemble – Main Lobby of Harriet Irving Library Capacity: 30 students	U First Assemble – Main Lobby of Tilley Hall Capacity: 60 students
Physics Practical invisibility Assemble – outside between buildings IUC Physics and 31 IUC Library. In case of rain: stand inside IUC Physics Capacity: 30 students	U First Assemble – Main Lobby of Tilley Hall Capacity: 60 students	

Information Desks: Main Lobby of Tilley Hall from Noon to 3:30 p.m.
Main Lobby of Head Hall from 1:00 pm 3:00 p.m.

T-shirts from previous competitions will be available at the Tilley Hall Information Desk for a donation of \$10.00.

DESCRIPTIONS of Demonstrations

Art Centre: (Coordinator – Lori Quick) **Sessions 1 and 2.**

Come to the UNB Art Centre and enjoy an afternoon of creativity and fun. Find out how the simplest marks on paper can become works of art using music and spontaneity. All you need is an open mind and a willingness to experiment.

Location: Please go to the main lobby of Memorial Hall.

Capacity: 12 students per session.

Biomedical Engineering: (Coordinator – John Landry) **Sessions 1, 2, 3.**

Motion Analysis:

Did you ever wonder how King Kong or Golum in the Lord of the Rings were created? In both cases the movements of a human actor, Andy Serkis, were filmed and then used to create the movements of the animated character.

Motion analysis was developed not for the movies but to analyze motion for medical and sports purposes. The movies came along later. On this visit you will see how motions are captured and converted to data which can then be used in animation or for the analysis of how well someone walks or uses an artificial limb. Our lab has a VICON motion analysis system which uses 8 video cameras and an array of other equipment to measure how people move.

Location: Please go to the entrance of R.N. Scott Hall, Biomedical Engineering Bldg, down the hill from the Bookstore to be guided to the demonstration.

Capacity: 15 students per session.

Business Administration: (Coordinator – Glenn Cleland) **Session 1.**

The Millionaires' Club – Learn How to Manage a Million Dollars!

A small group of business students at UNB are responsible for managing a real portfolio that is now valued at \$1.3 million! On May 9th, participants in the “Millionaires’ Club” will meet with students from the Student Investment Fund class to learn a few tips on how to manage a million dollars and compete for a prize.

Location: Please assemble in the main lobby of Tilley to meet your guide.

Capacity: 20 students.

Chemistry: (Coordinator – Shane Beattie) **Sessions 1, 2, 3.**

Why am I still driving a gas guzzler?

Despite concerns over global warming, rising oil prices and declining oil reserves our society is still heavily dependent on gas and oil. This presentation will look at reasons for our current use of oil and ‘green’ alternatives to gasoline such as hydrogen and Li-ion batteries.

Location: 42 Toole Hall – follow the signs.

Capacity: 15 students per session.

Computer Science: (Coordinator – Weichang Du) **Sessions 2 and 3.**

Computer and Video Game Programming Demonstration

In this demonstration, we will show students step by step how to program computer and video games using computer programming, graphics, and animation techniques. Students will have opportunity to hands-on do some simple game programming by themselves including applying simple math.

Location: Please gather in the main lobby of Head Hall to meet your guide.

Capacity: 35 students.

Economics: (Coordinator – Van Lantz) **Session 2.**

Ever wonder about how the economy works? How some companies sell products cheaper than others? When demand is greatest for a product? Why countries trade with one another?

Come and learn about the forces of demand and supply using a computer simulation game.

Compete with other players in a game where you are in charge of buying and selling goods on different planets in a make-believe galaxy.

Location: Please gather in the lobby of the Harriet Irving Library to meet your guide.

Capacity: 30 students.

Engineering: (Coordinator – Josie Seely)

Engineering applies the principles of mathematics and science to find practical solutions to technical problems.

There are several engineering disciplines offered at the University of New Brunswick and the short presentations will provide some insight into several fields of specialization – chemical, civil, electrical & computer, geodesy & geomatics, and mechanical.

Chemical engineering applies the principles of chemistry, physics, mathematics, and economics to industrial processes involving chemical transformations: e.g., the making of paper from wood; the production of rubber, plastics, fibers, resins, fuel, lubricants, and useful metals from ores. **Civil** engineering deals with the systems and facilities associated with humanity's needs for shelter, work and transportation, which include: airports, highways, buildings, industrial plants, dams, housing, hydro developments, water supply, bridges, sewage and sewage disposal, and marine facilities. **Electrical & Computer** engineers deal with all aspects of electricity from production to applications such as computers, control systems, communications and even biological effects. **Geodesy & Geomatics** engineering applies the principles of mathematics and physics in the measurement and representation of the geometric and physical features of our environment, both natural and man-made, on, above, and below the earth's surface, on land or under water. **Mechanical** engineering applies the principles of mathematics and science to the design of moving components, whether mechanisms or machines, to the motion of solids and fluids, and to the analysis of the forces and energy required for the motion.

Location: Please assemble at the help desk in the main lobby of Head Hall for **all Engineering activities**.

• **Chemical Engineering:** (Coordinator – Guida Bendrich) **Session 1.**

Cold Rolling of copper

Cold rolling is a metalworking process in which metal is deformed by passing it through rollers at a temperature below its recrystallization temperature. Cold rolling increases the yield strength and hardness of a metal by introducing defects into the metal's crystal structure. These defects prevent further slip and can reduce the grain size of the metal, resulting in Hall-Petch hardening (http://en.wikipedia.org/wiki/Cold_rolling).

Let's squish some copper bars and make some bracelets for yourself and your friends.

Location: Please assemble in the main lobby of Head Hall

Capacity: 15 students

- **Civil Engineering:** (Coordinator – Bruce Wilson) **Session 1.**

SIM Sewer

You've played simulation games where you get to direct the everyday lives of Sims. In this session we'll look at using simulation software to design water and sewer systems, transportation networks, and structures such as bridges. How long will it take contamination in a water system to spread throughout a city? How can you avoid flooding due to a sewer backup? Try to build a simulated bridge for the least cost. This session will use current engineering software (and a few games) on Smartboards in a hands-on interactive session.

Location: Please assemble in the main lobby of Head Hall

Capacity: 15 students

- **Electrical & Computer Engineering:** (Coordinator – William Briggs) **Sessions 1 and 2.**

Fun with Electricity

Watch In the first part of the session students will observe some interesting demonstrations, including the almost magical effect of eddy currents, the astonishing force possible in a small electromagnet, the world's simplest electric motor, and the shocking Van de Graff generator.

Do In the second half of the session, students can do some hands on activities, including use of the Van de Graff generator on their own, and making their own light control slider resistors with nothing more than a pencil and a piece of paper.

Location: Please assemble at the main lobby of Head Hall to meet your guide.

Capacity: 24 students.

- **Geodesy and Geomatics Engineering:** (Coordinator – Kim Delorey) **Sessions 1, 2, 3.**

On mice and bats.

You all know how to use a computer mouse but have you ever tried a "bat?" GGE, with the help of IVS 3D, will show you a powerful interactive 3D data visualization system that is used to "see" what's on the bottom of the ocean.

Location: Please assemble at the main lobby of Head Hall to meet your guide.

Capacity: 20 students.

● **Mechanical Engineering:** (Coordinators –Rickey Dubay and Marwan Hassan) **Session 3.**

Magnetic levitation and mechatronics.

Magnetic levitation is used in many industrial applications, particularly for high speed trains and for magnetic bearings in high speed machines, such as large gas compressors. You will see our small model of a magnetic levitation system, which we use to work on methods to control the final position and velocity of a disk that lies between two electromagnets.

Mechatronics is the combining of mechanical systems with electronics, sensors and computer control. Good examples are many kinds of automated equipment such as robots. You will see some examples of such systems built by students taking our Mechatronics Option.

Location: Please assemble at the main entrance of Head Hall.

Capacity: 30 students.

Forestry: (Coordinator – Brian Sergeant) **Session 3.**

Play forestry's computer game, TREES, and explore how trees grow and compete with one another over time. It may take a human life-time for a tree to grow from a seedling to maturity but the "TREES" game can simulate this process in a matter of minutes. The game allows a player to 'plant' seedlings of different species at various distances apart and then show how the trees will grow and change over time. Use "TREES" to plant and manage a forest for Christmas trees, pulpwood or sawlogs. Plant mixtures of tree species to discover the differences between them in life-span, height and crown growth.

Experiment with "TREES" and answer "what if" questions. For example:

- **What if** I planted a number of seedlings at one-meter spacing? Would the trees die quickly from overcrowding? Do some species require more growing space than others?
- **What if** I cut some of the trees? Would the remaining trees grow faster?

Location: Please assemble in Room 013/015 in the basement of the New Forestry Building.

Capacity: 30 students.

History: (Coordinator – Gary Waite) **Session 2.**

A harmless old woman or a secret agent of Satan?

Step into the time capsule for a trip back to one of the most interesting periods in history, to a time when the scientific revolution was just beginning, and when the universe was a frightening place indeed. Four hundred years ago many perfectly sane citizens, judges, government leaders and (gulp!) university professors, became utterly convinced that the Devil was plotting the destruction of the world as they knew it and using witches as his secret agents. As a result, thousands of people, mostly women, were legally executed for supposedly performing evil magic, flying on broomsticks and keeping demonic housepets (never trust your cat again!). We now know that these charges were false, and laugh at witches and demons at Hallowe'en or on TV. But it's up to the historian to understand why this strange event occurred and what it tells us about the beliefs of people in the past and how these can help us to better comprehend our own.

Location: Come to the main entrance to Tilley Hall and straight ahead into T102 (the main lecture theatre) for a fascinating journey into the past.

Capacity: 250+ students.

Physics: (Coordinator – Benedict Newling) **Session 1.**

The Prospects for Practical Invisibility

The physical phenomenon of refraction is responsible for a host of our everyday experiences: refraction causes stars to twinkle, a spoon in a glass of water to appear bent (even when the water is poisoned) and mirages to form and give one false hope when lost in the desert.

Recent physics developments of new materials ("metamaterials") with unlikely refractive properties have raised the possibility of bending light completely around an object to render it invisible. We will discuss the prospects for knitting your own invisibility cloak or building your own cloaking device in order to hide from your enemies. Or friends.

Location: Please assemble outside between IUC Physics and IUC Library, at the entrance to IUC Physics. Step inside if it is raining.

Capacity: 30 students.

U First: (Coordinator – Dax Maclean) **Sessions 2 and 3.**

The U First department provides information about the academic programs and services available at the University of New Brunswick to middle school and high school students, their families, teachers and guidance counselors. For further information, please call 1-888-895-3344.

Math Jeopardy

This fun session has been designed so you can show off your math knowledge! U First will be hosting a jeopardy style event where students can compete against one another in a team environment as you learn more about UNB and use your math knowledge to gain team points. Teams will be competing for prizes to be awarded at the end of the session.

Location: Please go to the main entrance of Tilley Hall to be taken to T303.

Capacity: 60 students.
