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## Math goes viral

By **Jamie Hanlon**

December 10, 2009 - (Edmonton) At least a dozen Alberta high-school calculus classrooms were exposed to the West Nile virus recently.

Luckily, however, it wasn't literally the illness. University of Alberta education professor Stephen Norris and mathematics professor Gerda de Vries used the virus as a theoretical tool when they designed materials for use in an advanced high-school math course. The materials allow students to use mathematical concepts learned in their curriculum to determine the disease's reproductive number, which determines the likelihood of a disease spreading.

The approach is a marriage of science and math, subjects the researchers say seem to exist in separate worlds at a secondary-school level, but that when brought together can effectively bring real-world scenarios into the classroom to enhance learning and understanding.

Not to mention answering that ages old high-school student question: "why do I need to know this?"

"This piece was designed to satisfy an optional unit in Math 31 (Calculus), for which there are no materials, so we said, 'let's fill the gap,'" said Norris. "These materials show a real application of mathematics in the biology curriculum for high-school students."

Norris and de Vries chose a published academic math paper on the transmission of the West Nile



Stephen Norris

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virus and modified it -keeping the science intact, but making it readable and practical for high-school calculus students.

The information and equations in the original paper dealing with disease transmission were then used as the basis for calculus math problems to be solved by the students. Students were presented with a variety of materials that covered topics and concepts such as rate of change, exponential growth-decay models, and models for the carriers of the virus, including mosquitoes and infectious and susceptible birds. The students' mathematical skills were then put to use in determining the spread of the disease using various parameters, which included variables such as biting rate and the probability of infection.

Norris underlines that the project challenged the students to see and understand science in a different fashion from what they learn inside the science curricula. He points out that high-school classroom scientific experiments are "proven" science and have been around for at least 300 years, in many cases. For the students to discover that real scientists often work with some assumptions that they know to be false in order to reach their conclusions was certainly an eye-opening realization for them, he says.

"There's no way out of the fact that the knowledge you gain from science is imperfect; it's tentative and subject to change," said Norris. "I think that's what struck the students between the eyes."

Both researchers agree that this form of collaborative, interdisciplinary learning can take place across all subject areas. De Vries and Norris are currently working on another project that focuses on population genetics that will fit into Grade 12 biology and math courses.

"It's mathematics in the real world. Kids are always asking, 'why am I learning this,'" she said. "All of a sudden the mathematics that kids have learned comes together in a project like this."

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