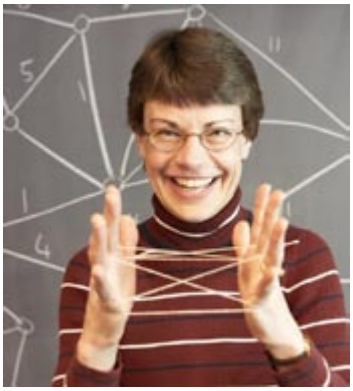

Research Profile

Research on the Edge: Exploring Mathematical Networks

Ortrud Oellermann
Professor, Mathematics & Statistics

Ortrud Oellermann's initial description of what she does is deceptively simple. "It's solving problems about networks," she says, illustrating the idea with a diagram, a picture of a mathematical graph that looks like string art.

The image is comprised of nodes, called vertices, connected by lines called edges. The edges represent a relationship of some kind between the vertices. In practical terms, the edges might be the roads between intersections or the lines in a communications network. Or the edges and vertices might only exist in the world of theoretical mathematics, like the ones with which Oellermann works.

For a layperson, the abstract notions involved in Oellermann's research can soon begin to muddy the simple picture she has laid out. But for Oellermann, these complex ideas are all grounded in clear and systematic reasoning. "I've always loved mathematics, even when I was a young child," she says. "The rigour of it, and the objectivity—the rules are very well defined. In the other sciences, theories are eventually modified, but in mathematics a theorem will always stand as a theorem once it's been proven. I've always found that very appealing."

Among other things, Oellermann is known as an expert on Steiner Distance problems, which deal with sub-networks within graphs. Think of the many things we require our computer and communications networks to do: as new networks spring from nodes already in use, Oellermann's work helps determine the most efficient use of present and future connections. Well-known in her field, she has been sought out by mathematicians from other countries interested in working with her and gaining greater understanding of Steiner Distance problems.

Oellermann's current research includes work on another mathematical notion: the path partition conjecture for graphs. "The conjecture has been proven for many classes of graphs but is largely still open," says Oellermann, whose goal is to make the conjecture a proof, by trying one possible approach after another.

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Collaboration—such as her work with other mathematicians on Steiner Distance problems or the more recent studies of path partition conjecture—is an important and exciting part of Oellermann's work.

"Mathematics is quite different from the other sciences in that the research is not experimental," says Oellermann. "Sometimes when you work on your own, you can reach a dead end, so collaboration is very fruitful—it leads to new ideas and approaches. While you work on a problem, more questions come up—these lead to the next problem."

To learn more about her research on mathematical networks, contact University of Winnipeg faculty member Ortrud Oellermann at ***o.oellermann@uwinnipeg.ca***