Professor Profile: Tom Thompson

"If you had told me at my college graduation that seven months later I'd be back in school studying mathematics, I would've looked at you and asked what planet you were from." Tom Thompson, professor of mathematics, had planned for medical school after earning his chemistry and mathematics degrees. Within a few months he realized that practicing medicine wasn't for him.

Now entering his 41st year of teaching at Walla Walla University, Thompson loves every minute of teaching math.

"I love watching a student's eyes as we work through a problem together," he says. "The glazed over look is evident, but when it starts to come together, the eyes widen and brighten, and they smile. I can never get enough of the 'aha!' moment."

When he's not teaching or sponsoring students at math events, Thompson enjoys studying astronomy, woodworking, growing grapes and making juice, backpacking, hiking, and firing his 4-inch steel cannon he affectionately calls, "Boomer."

Pop Quiz! Try This Putnam Puzzler

You have coins $C_1$, $C_2$, ..., $C_n$. For each $k$, $C_k$ is biased so that, when tossed, it has a probability $1/(2k+1)$ of falling heads. If the $n$ coins are tossed, what is the probability that the number of heads is odd? Express the answer as a rational function of $n$.

Math Grad: “I study explosions”

Take a steel tube that is longer than two cars and big enough to crawl through. Then vacuum out the air, and fill the tube with flammable gases. Set off an explosion in one end, and take a picture of the flame at the other end.

Sound like more fun than work? Then you might be interested in Jason Damazo’s job. Damazo graduated from Walla Walla University in 2007 with degrees in mathematics and engineering, and works in aeronautical engineering at Caltech while he pursues his Ph.D. in aeronautical engineering. He designs, builds, and conducts experiments to examine supersonic combustion in an underground research laboratory.

Experiments like the pipe explosion take planning and are over in the blink of an eye. “If I did everything right the explosion turns into a detonation, a flame that travels faster than the speed of sound, and runs down to the far end of the tube at about 2.5 kilometers per second,” Damazo says. “There is a window in the far end where I take a picture of the detonation wave during the 50 microseconds the wave is in the field of view. When I run the experiment, it’s all over in about 3 milliseconds—there’s a bright flash and a loud ping to remind me that it is in fact an explosion.”

Damazo explains his work helps us “understand the physics involved in high-energy, high-velocity fluid mechanics.” His education at WWU—specifically interactions with his professors—prepared him for this career, he says.

“The great engineering and math teachers at WWU gave me a solid education,” he says. “Due to the openness between departments, I obtained degrees in both math and mechanical engineering. This gave me a firm background in applied engineering, and yet still allowed me to gain fundamental understanding of the mathematics.”

Damazo dreams of working for NASA, designing space vehicles or possibly becoming an astronaut. But for now he is happy to have a job where he can “do cutting-edge research in physics, visualizing a phenomenon for the first time.”

“If I were speaking to someone with specialized knowledge in the field, I tell them I perform ‘reflected detonation experiments’ to explore the interaction of reflected shock waves with the boundary layer induced by an incident gaseous detonation,” he says. “But if I meet somebody on the airplane, I say, ‘I study explosions!’”

“Like that I can do science and still not be boring at parties.”
The Mathematics of Juggling

The work of Andrea Hawkins-Daarud, 2005 mathematics graduate, indicates the answer to that question just might be “yes.” Hawkins-Daarud, who works at University of Washington as a postdoctoral researcher, in a position akin to a residency for medical doctors, and she was recently awarded the NSF Postdoctoral Fellowship in Transformative Computational Science using Cyberinfrastructure.

Hawkins-Daarud’s research investigates the growth of tumor cells based on a mathematical model developed by Dr. Kristin Swanson, Hawkins-Daarud’s advisor. The model is based on two key parameters and regarding the invasiveness and the proliferation potential of the tumor cells, explains Hawkins-Daarud. “MRI is the only tool where it is dense enough, but glioblastomas are known to have a large diffuse area that is not dense at all. So we’re using math to get a better estimate of where the tumor is.”

After looking at patients’ images, they found both parameters could be estimated, which lead to significant indicators of how the patient will respond to radiotherapy. “I am specifically interested in getting good estimates of new parameters, seeing how the error in the values propagates through the prediction, and what ranges of parameters will be linked with prognostic factors,” says Hawkins-Daarud.

This research is still in a preliminary phase, but it has caught the attention of doctors everywhere. Though results have been published in many medical journals, more clinical trials are required in order to make the procedure official. "The classes I took and the skills I learned in order to make the procedure official, journals, more clinical trials are required in order to make the procedure official." says Hawkins-Daarud.

Is this what you envisioned when you chose a math major?

I knew I wanted to be an actuary, but I hadn’t decided whether I wanted to work in an insurance company or a consulting firm. After talking to a variety of people and having the opportunity to work at Milliman for a summer job, I decided that consulting work suited me best.

What do you like most about your job?

I get paid to help solve mathematical problems to make sure that employers are able to provide cost effective employee benefit programs to thousands of employees and retirees. It feels good to know that I can use numbers to make a difference in people’s lives.

What advice would you offer a math major today?

There are many opportunities in the math field. Take the time to do lots of research and talk to people in various math related fields. Try to find research opportunities for math majors and discover the actuarial profession. My education at WWU gave me the basic math skills to pass my first few actuarial exams, and the computer skills to be confident that I could compete in the business world. I was confident I would succeed, although I did have to work seven long years to get through the actuarial exams. Finishing those exams was the best thing I ever did; it opened up lots of opportunities. What advice would you offer a math major today?