# Montana Tech

## COMPUTATIONAL SCIENCE GRADUATE CERTIFICATE

Today's industry, government, and academia seek graduates with expertise in science and in computing, who understand how to design and code simulations and models to understand and predict scientific and engineering phenomena. Montana Tech's Computational Science Certificate program is designed to give students and working professionals exactly this competitive combination of skills and knowledge.
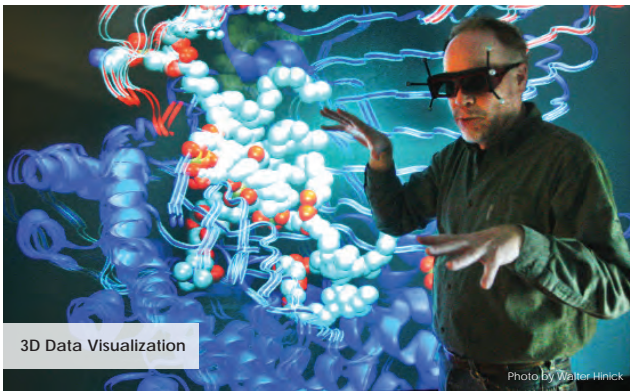
## MONTANA TECH

**Located in Butte, Montana—the "Richest Hill on Earth"—**Montana Tech was established in 1900 as Montana's School of Mines. With a strong heritage in engineering, science, and technology—blending theory with practice to meet the changing needs of society. Montana Tech houses a 22-node High Performance Computing (HPC) cluster and immersive 3D visualization lab available for computational science courses and student projects. With academic and research strengths in numerous engineering fields, mathematics, chemistry, biology, geoscience, computer science, software engineering, and statistics, Montana Tech is ideally situated to offer this Computational Science Certificate.

**Montana Tech is a public university accredited through the Northwest Commission on Colleges and Universities (NWCCU).** Our strongest attributes are our extraordinary faculty, talented students, and exemplary hands-on academic programs and research projects. Students, faculty, and staff enjoy the nearby recreation opportunities, ranging from historical sites to hiking, fishing, skiing, hunting, hot springs, and major parks and wilderness areas to explore.

## Montana Tech

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Butte, MT 59701
406.496.4304
graduatedean@mtech.edu

3D Data Visualization
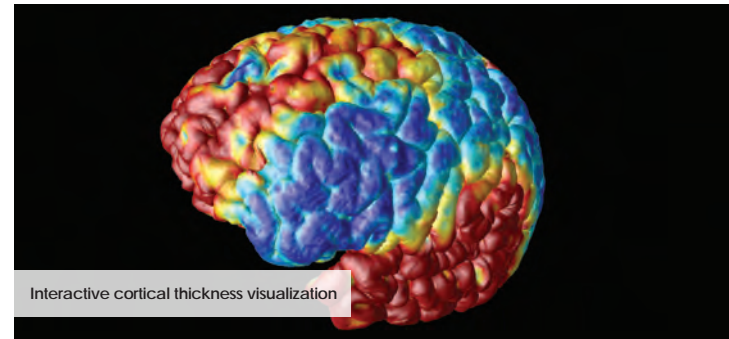Photo by Walter Hinick


Montana Tech students at Grace Hopper Conference


Montana Tech's High Performance Computing (HPC) cluster


Students receive assistance in computer lab


Interactive cortical thickness visualization

# COMPUTATIONAL SCIENCE GRADUATE CERTIFICATE

Montana Tech's Computational Science Certificate is designed for natural scientists, mathematicians, statisticians, social/behavioral scientists, computer scientists, and engineers seeking to use the full power of computer modeling and simulation to advance understanding, experiment, and theory in the broad range of science and engineering fields. The computational science curriculum exposes students, as subject matter experts in a science, mathematics, or engineering field, to courses in computational science, scientific programming, scientific and data visualization, and simulation and modeling. Students will develop analytical and numerical solutions and codes that are applied to domain specific problems that contribute to important research and applications in health/medicine, environmental science, materials and manufacturing, engineering, natural resources, agriculture, and the social sciences.

The Computational Science Graduate Certificate program is designed to give students and working professionals a competitive combination of skills and knowledge by integrating computational science topics such as algorithm development, numerical analysis, computer hardware and software, modeling and simulation, and scientific and data visualization with their domain specific knowledge to enable more effective problem solving capabilities as applied to complex problems in their field. *Students will complete a multidisciplinary capstone project in computational science and an applied scientific domain.*

Montana Tech houses a 22-node High Performance Computing (HPC) cluster, which students can use for running computational intensive simulations. An HPC Application Scientist is available to assist students with running existing modeling packages or their own on the HPC cluster.

**For Admission to the Computational Science Graduate Certificate Program**, apply on-line or download a printable application form at:
**mtech.edu/academics/gradschool/apply**

## COMPUTATIONAL SCIENCE CURRICULUM: 15 CREDITS

| CORE COURSES | CREDITS | PREREQUISITE |
|---|---|---|
| M 510 - Numerical Computing | 3 | M274 or M333 |
| CSCI 577 – Computer Simulation and Modeling | 3 | M274 & Programming Exp |
| CSCI 580 –Parallel Computing | 3 | CSCI 577 or M526 |
| CSCI 599 or XXXX 599 Project | 3 | CSCI 577 or M526 |

### EXAMPLE ELECTIVES:
CSCI 544 - Data Visualization
GEOP 591 – Numerical Computing
M 526 - Mathematical Modeling
CSCI 551 – Computational Biology (offered at UM, MSU)
GEOE 532 – Geochemical Modeling
PET 511 – Advanced Reservoir Simulation

*The 15-credit certificate consists of a 12-credit core and 3 credits of electives. It can be completed in 1 year or concurrently with a bachelor's or master's degree.*