Mathematical Sciences

------ **DEGREES OFFERED** ------

- M.S. In Mathematics
- M.S. In Statistics
- M.S. In Mathematics Education
- Ph.D. In Mathematics
- Ph.D. In Statistics
- Ph.D. In Mathematics Education

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The Department of Mathematical Sciences offers a wide range of technical and research degrees and is a recognized leader of research in the mathematical sciences. Much of the research is conducted in collaboration with various science departments, university centers, and collaborators worldwide.

The department conducts research in both pure and applied mathematics with emphases in dynamical systems theory, mathematical biology and applied and computational mathematics. Joint research also involves engineering and the biological sciences.

Statistics research encompasses a broad range of theoretical and applied topics with several interdisciplinary opportunities including the environmental and ecological sciences.

Mathematics education research takes an applied approach, addressing issues that surround mathematics teaching and learning with a focus on the development and ongoing support of K-12 mathematics teachers. Active research venues include content courses and field experiences for pre-service teachers, students and teachers in K-12 classrooms, professional development for in-service teachers, and online learning environments.

The department provides unique opportunities for innovative instruction and cooperative research. With approximately 26 Ph.D. faculty and around 70 graduate students, the department is large enough to attract and retain the most capable faculty, but small enough to allow faculty and graduate students an intimate atmosphere for the easy exchange of ideas.

MONTANA STATE UNIVERSITY | The **GRADUATE SCHOOL**

RESEARCH ACTIVITIES

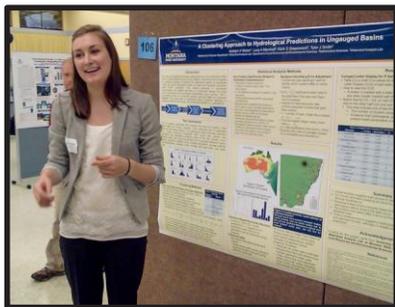### Pure and Applied Mathematics
- Topological field theories
- Homotopy theory of manifolds
- Algebraic topology
- Harmonic analysis
- Tiling spaces
- Dynamics of iterated maps
- Symbolic dynamics
- Oscillations in excitable media
- Numerical methods for solving partial differential equations
- Applied partial differential equations
- Numerical analysis
- Bifurcation analysis
- Complex analysis
- Fractal geometry
- Mathematical biology
- Computational analysis of complex dynamical systems
- Mathematical modeling of biofilm-related phenomena and its numerical simulation
- Derived geometry
- Mathematical image processing
- Optimization

Statistics
- Functional data analysis
- Adaptive cluster sampling
- Ecological and environmental statistics
- Response surface methodology
- Experimental design
- Spatial statistics
- Bayesian hierarchical modeling
- Value-added modeling
- Structural equation modeling
- Statistical education
- Statistical computing
- Time series analysis

Mathematics Education
- Classroom research experiences for in-service and pre-service teachers
- Mathematical modeling in the elementary classroom
- Effective models of school-based professional development
- Teacher learning in the online environment
- The intersection of mathematical content knowledge and teaching
- Engaging teachers and students in mathematical practice

REQUIREMENTS AND APPLICATION

M.S. and Ph.D. degree requirements vary in each of our three areas: Mathematics, Statistics and Mathematics Education. M.S. degrees are predominantly non-thesis degrees but may incorporate research components. All Ph.D. degrees require original research in the student's area of interest and findings are presented in a dissertation.

Visit our website at www.math.montana.edu/grad/index_future.html for detailed information on degree requirements, course offerings, assistantships and records of who employs our graduate students.

For program inquiry please fill out the *Request Information* link on The Graduate School homepage at www.montana.edu/gradschool. To apply, start at www.math.montana.edu and follow the links: *Future Students, Graduate, How Do I Apply?*

INTERDISCIPLINARY OPPORTUNITIES

Much of the research conducted in the department is done in collaboration with other departments and research programs. Past and current alliances include applications in neuroscience, genetics, biofilm modeling, analysis of atmospheric data, solar physics, chemical engineering, ecology and the Yellowstone ecosystem, and education. Housed within Mathematical Sciences, the Statistical Consulting and Research Services provides not only data analysis but also guidance on statistical methodology at every stage of research to a broad spectrum of clients across Montana.

FINANCIAL ASSISTANCE

Graduate teaching assistantships are available for qualified graduate students. GTA appointments usually require teaching one lower level course each semester. Graduate research assistantships may be available for student consultants working for Statistical Consulting and Research Services, or students working with faculty on funded research projects. Scholarships and fellowships are awarded to our best applicants.

Photos, front – small: Dr. David Ayala and PhD students discussing the Lie group of unit quaternions Photos, this page – from top: Katelyn Weber presents research results at the Student Research Celebration at MSU; Dr. Kevin Wildrick studies the role of distance in mathematics, particularly in analysis and geometry. He is also an avid climber; Dr. Mark Greenwood and PhD Candidate Chris Barber discuss results of their collaborative research with researchers at the National Institutes of Health exploring cerebrospinal fluid biomarkers for discriminating Multiple Sclerosis status; Master of Science students in the MSMME program test a mathematical model