# Stochastic Partial Differential Equations
## Math 533–01    Spring 2020
## TR    11:00 am – 12:15 pm    WORKC 109

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| **Instructor:** | Dr. Bixiang Wang |
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| **Office Hours:** | TR 08:00–09:30 am, F 08:00–09:00 am (or by appointment) |
| **Prerequisite:** | Math 438 or equivalent passed with grade C- or better |
| **Textbook:** | *A Concise Course on Stochastic Partial Differential Equations*, by Claudia Prevot and Michael Rockner, Springer-Verlag, 2007. |

**Course Learning Outcomes**: This course is a continuation of stochastic integrals discussed before. The main purpose of this course is to study the existence, uniqueness and continuity of solutions of stochastic differential equations driven by Brownian motion, which include the stochastic ordinary differential equations as well as stochastic partial differential equations. In particular, we discuss the basic idea and procedure of the monotone approach to solve stochastic equations by extending the deterministic method to the stochastic case. By the end of this course, the students should be able to

- Describe the definition of solutions to stochastic differential equations

- Understand the pathwise uniqueness of solutions of stochastic equations.

- Describe the idea of monotone method.

- Prove the existence of solutions by combining the Galerkin method and the monotone method.

- Prove the uniqueness of solutions by uniform estimates.

- Prove the continuity of solutions with respect to initial data.

- Prove the stability of stochastic PDEs.

**Program Learning Outcomes**: Learning objectives for the math departments undergraduate and graduate degree programs can be found at

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http://infohost.nmt.edu/~math/about/learningoutcomes.html
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**Course Contents:** The course will cover the following material.

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| Chapter 3 | Stochastic Ordinary Differential Equations |
| Chapter 4 | Stochastic Partial Differential Equations |
| Appendix A | The Bochner Integral |
| Appendix B | Hilbert-Schmidt Operators |

**Attendance:** It is expected that students attend every class scheduled for this course. Students are responsible for all announcements and material covered in class.

**Exams:** No exams for this course.

**Homework:** Homework will be assigned indefinitely that depends on the progress of the class. Late homework will not be accepted.

**Cell Phones:** Your cell phones should be set on vibrate when you come to class.

**Grading:** Your final grade will be determined by the points you have earned from your homework. A maximum of 100 points is possible.

90-100: A;    80-89: B;    70-79: C;    60-69: D;    below 60: F. Plus/minus grades will also be used, but there are neither A+ nor D- grades.

**Counseling and Disability Services:** New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office of Counseling and Disability Services (OCDS) as soon as possible. In addition, New Mexico Tech offers mental health and substance abuse counseling through the Office of Counseling and Disability Services. The confidential services are provided free of charge by licensed professionals. To schedule an appointment, please call 835-6619.

**Academic Honesty:** New Mexico Tech's Academic Honesty Policy can be found starting on page 59 of the NMT catalog,

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http://www.nmt.edu/images/stories/registrar/pdfs/2013-2014_UNDERGRADUATE_Catalog_
FINAL.pdf
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You are responsible for knowing, understanding, and following this policy.

**Changes:** The instructor reserves the right to modify the course plan if necessary. But any changes will be announced in class.