BMETE95MM41 **Stochastic Analysis** Spring 2025

SPECIFICATIONS: 8 credit course; 3×90 minutes per week
INSTRUCTOR: Balázs Ráth, CONTACT: rathbalazs@gmail.com
WEBPAGE: www.math.bme.hu/∼rathb, LANGUAGE OF LECTURES: English
DATES AND TIMES: see Neptun
OFFICE HOURS: Tue 16.00-17.00, LOCATION OF OFFICE HOURS: videochat

TEXTBOOKS:

- H-H. Kuo, *Introduction to Stochastic Integration*, Springer, 2008.
- F.C. Klebaner, *Introduction to stochastic calculus with applications*, (Third edition) Imperial College Press, 2012.
- R. Durrett. *Stochastic calculus: a practical introduction.* Vol. 6. CRC press, 1996.

PREREQUISITES: We will routinely use basic facts of calculus and probability theory and assume that students already took an introductory course on these topics.

COURSE OUTLINE: martingales, discrete Doob decomposition, Gaussian process, Brownian motion, Itô integral, Itô process, Itô formula, martingale representation theorem, stochastic differential equations, strong and weak solutions, diffusions and related parabolic and elliptic PDE's, change of measure, Girsanov's formula, option pricing in Black-Scholes model.

MIDTERM: There will be two 45 minute midterm exams during the regularly scheduled class on *March 26* and *May 7*.

HOMEWORK ASSIGNMENTS: Weekly homeworks will be assigned, collected (in written format on paper) and graded. Homeworks that are handed in late will not be accepted.

GRADING POLICY: The students are required to collect 40% of the homework marks and 40% of the midterm (or the resit midterm) marks for both midterms in order to enter the final exam. The students are required to collect 40% of the final exam marks in order to pass the course.

Ingredients of the final grade:	*Calculation of the final grade:*
50% : Final exam grade	$0 - 39\%$: insufficient (1)
15% : First midterm grade	$40 - 54\%$: sufficient (2)
15% : Second midterm grade	$55 - 69\%$: satisfactory (3)
20% : Weekly homework grade	$70 - 84\%$: good (4)
	$85 - 100\%$: excellent (5)