

باسمه تعالی

درس فرآیندهای تصادفی نیمسال دوم سال تحصیلی ۱۴۰۰-۱۴۰۱

۱) ارائه دهنده: سیدمحمدصادق موحد یکشنبه و سه شنبه ساعت ۸:۳۰ تا ۱۰:۳۰

۲) لینک کلاس درس

<https://vc15.sbu.ac.ir/class-4002161820601/>

۳) نمره درس شامل ۸ نمره تمرینات ، ۲ نمره کوییز ، ۹ نمره امتحان (امتحان میان ترم و پایان ترم)، ۲ نمره پروژه (جمعاً ۲۱ نمره).

۴) امتحان میان ترم فروردین ۱۴۰۱ .

۵) استاد حل تمرین: محمدحسین جلالی و آناهید کیانی

۶) زمان کلاس حل تمرین:

۷) مراجع اصلی

For mathematical definition of Random Fields:

- 1- The Geometry of Random Fields, Robert J Adler, 1981.
- 2- Topological Complexity of Smooth Random Functions, Adler, Robert, Taylor, Jonathan E., Springer, 2009.
- 3- Geometry, Topology and Physics (Graduate Student Series in Physics) by Mikio Nakahara, 1990.

For Stochastic Processes:

- 4- M. Reza Rahimi Tabar, Analysis and Data-Based Reconstruction of Complex Nonlinear Dynamical Systems, Using the Methods of Stochastic Processes, Springer, 2019
- 5- Rudolf Friedrich, Joachim Peinke, Muhammad Sahimi, M. Reza Rahimi Tabar, Physics Reports 506 162–87 (2011)
- 6- Risken, Hannes, Frank, Till, The Fokker-Planck Equation Methods of Solution and Applications, Springer 1996.
- 7- An Introduction to Stochastic Processes in Physics Kindle Edition by Don S. Lemons, 2003.
- 8- An Introduction to Random Vibrations, Spectral & Wavelet Analysis: Third Edition (Dover Civil and Mechanical Engineering)
- 9- Probability, Random Variables and Stochastic Processes 4th Edition, by Athanasios Papoulis, S. Unnikrishna Pillai, McGraw-Hill Europe; 4th edition (January 1, 2002).
- 10- Stochastic Modelling for Systems Biology (Chapman & Hall/CRC Mathematical and Computational Biology Book 44) 2nd Edition, Kindle Edition, by Darren J. Wilkinson, 2011.
- 11- Independent Component Analysis, Aapo Hyvärinen, Juha Karhunen, Erkki Oja, 2001.
- 12- Nonlinear Time Series Analysis 2nd Edition by Holger Kantz, 2003.
- 13- Brownian motion and Stochastic Calculus, 2nd Edition, Ioannis Karatzas, Steven E. Shreve, 1996.

۸) دیگر منابع مرتبط

- 14- Independent Component Analysis, Aapo Hyvärinen, Juha Karhunen, Erkki Oja, 2001.
- 15- Data analysis: A Bayesian Tutorial, by D.S. Sivia & J. Skilling, Oxford science Publication, 2010
- 16- Data reduction and error analysis for the physical sciences, P. R. Bevington & D. K. Robinson, McGrawHill, 2003
- 17- Error of Observations and their Treatment, J. Topping, 1972.
- 18- Practical Physics, G. L. Squires, 1985.
- 19- Stochastic Calculus for Finance I: The Binomial Asset Pricing Model (Springer Finance), Steven E. Shreve, 2005.
- 20- Stochastic Calculus for Finance II: Continuous-Time Models (Springer Finance) (v. 2), Steven E. Shreve, 2004.
- 21- Diffusions, Markov Processes and Martingales: Volume 2, Ito Calculus 2nd Edition by L. C. G. Rogers, 2000.

۹) دست نوشته های درسی خودم که در وبگاه خودم با آدرس

<http://facultymembers.sbu.ac.ir/movahed/index.php/courses/132-advanced-course-on-computational-physics>

۱۰) دست نوشته های تحلیل داده های در وبگاه خودم با آدرس

<http://facultymembers.sbu.ac.ir/movahed/index.php/courses/132-advanced-course-on-computational-physics>

(۱۱) برنامه زمانبندی پیشنهادی درس فرآیندهای تصادفی در نیمسال دوم سال تحصیلی ۱۴۰۰-۱۴۰۱

| DATE: | Subject | DATE: | Subject |
|-------|--|-------|--|
| | Ito and stratonovich Calculus | | Introduction |
| | Fokker-Planck equation 1 | | Probability distribution function 1 |
| | Fokker-Planck equation 2 | | Probability distribution function 2 |
| | Covariant form of FP | | Probability distribution function 3 |
| | Power spectrum FFT Nyquist-Shanon Effect | | PDF transformations |
| | | | Topological and geometrical measures of stochastic fields: Characteristic function Perturbative expansion Non_Gaussianity 1 |
| | | | Midterm exam |
| | | | Non_Gaussianity 2 |
| | | | Crossing Statistics |
| | | | Weighted and unweighted TPCF Bias |
| | | | Random walk 1 |
| | | | Random walk 2 |
| | | | Langevin equation 1 |
| | | | Langevin equation 2 |
| | | | Langevin equation 3 |
| | | | Kramers Moyale equation 1 |
| | | | Kramers Moyale equation 2 |
| | | | Kramers Moyale equation 3 |
| | | | Pawla theorem |
| | | | Ornstein uhlenbeck process-nonlinear Langevin equation 1 |

سیدمحمدصادق موحد

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