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| **1. Course title:** Stochastic Processes | | | | | |
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| **2. Code:** | | **3. Type (lecture, practice etc.):** lecture | | | |
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| **4. Contact hours:** 2 hoursper week | | **5. Number of credits (ECTS):** 3 | | | |
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| **6. Preliminary conditions (max. 3):**   * Probability Theory and Statistics lecture * Probability Theory and Statistics seminar | | | | | |
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| **7. Announced:** ☐fall semester, ☒spring semester, ☐both | | | | | |
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| **8. Limit for participants:** 150 | | | | | |
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| **10. Responsible teacher (faculty, institute and department):**  András B. Frigyik, PhD (Faculty of Science, Institute of Mathematics and Informatics, Department of Applied Mathematics) | | | | | |
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| **11. Teacher(s) and percentage:** | | András B. Frigyik, PhD | | 100 % | |
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| **12. Language:** English | | | | | |
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| **13. Course objectives and/or learning outcomes:**  **Objectives:** The lecture intends to introduce students to the world of stochastic processes. The course gives an insight into the basic ideas and ways of thinking encountered in the area of stochastic processes.  **Learning outcomes:** students completing the course will have familiarity with questions and methods related to problems involving stochastic processes. | | | | | |
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| **14. Course outline**   1. Review of probability theory and other topics needed later 2. Poisson process and waiting times 3. Non-homogeneous and conditional Poisson processes 4. Renewal processes 5. Delayed renewal process, regenerative processes, stationary point processes 6. Markov chains, Chapman-Kolmogorov equation, classification of states, branching processes 7. Time reversible Markov processes, semi-Markov processes 8. Continuous time Markov processes, birth and death processes 9. Kolmogorov’s differential equation, time reversibility, queueing 10. Martingales, stoping time, sub- and super martingales 11. Random walk 12. Arrival time, maximal waiting time and Law of arcsin 13. Brownian motion and Wiener process | | | | | |
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| **15. Mid-semester works**  Attending lectures is highly recommended. | | | | | |
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| **16. Course requirements and grading**  The semester ends with an 80 point written exam. Depending on the score the grades are the following:  0%–33% fail (F)  34%–49% satisfactory (D)  50%–65% average (C)  66%–81% good (B)  82%–100% excellent (A) | | | | | |
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| **17. List of readings**   1. Feller, William. *An introduction to probability theory and its applications: volume I*. (3rd). New York: John Wiley & Sons, 1968. 2. Pinsky, Mark, and Samuel Karlin. *An introduction to stochastic modeling*. Academic press, 2010. | | | | | |
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| **18. Recommended texts, further readings** | | | | | |
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| **Date** | 4 May, 2017 | **Prepared by** |  | | |
| András B. Frigyik, PhD  responsible teacher | | |
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| **Endorsed by** | | |  | | |
| László Tóth, PhD program supervisor | | |