Program	Type of studies (cycle)	Third cycle
	Name of the program	Science and mathematics education

Course

Course title	**Stochastic processes**

Course code	Semester	Course status	ECTS credits	Contact hours
AMAT 652	II	Optional	10	30

Teaching staff	Teacher	
	Other staff	
Course goals	The course will provide a high-level overview of a wide range of statistical methods, data analysis, parameter estimation, testing theories and stochastic processes.	

Course content/topics

1. Markov chains: Construction and properties, Examples, Transience and recurrence, Canonical decomposition, Absorption probabilities, Limit distributions
2. Renewal Theory: Counting Renewals Renewal reward processes, Renewal Equation, Poisson process Discrete renewal theory, Stationary renewal processes, Improper renewal equations
3. Point processes: The Poisson Process, Transforming Poisson Processes, Max-stable and stable random variables, More transformation theory, Marking and thinning, Variants of the Poisson Process, The linear birth process as a point process
4. Continuous time Markov chains: Definitions and construction, Stability and explosions, The Markov property, Stationary and limiting distributions, Laplace transform methods

LITERATURE

[1] Asmussen, S., and Glynn, P. W., Stochastic Simulation, Algorithms and Analysis, Stochastic Modelling and Applied Probability Vol. 57, Springer-Verlag, New York 2007.

[2] Fedorov, V. V., Theory of Optimal Experiments, Academic Press, New York 1972.

[3] Florens, J.-P., Marchart, M., and Rolin, J.-M., Elements of Bayesian Statistics, Marcel Dekker, New York 1990.

[4] Goodwin, G. C., and Payne, R. L., Dynamic System Identification: Experiment Design and Data Analysis, Mathematics in Science and Engineering Vol. 136, Academic Press, New York 1977.

[5] Lin'kov, Y. N., Lectures in Mathematical Statistics, Parts 1 and 2, Translations of Mathematical Monographs Vol. 229, American Mathematical Society, Providence, R.I., 2005.

[6] Loève, M., Probability Theory I and II, 4th edition, Graduate Texts in Mathematics Vol.45 - 46, Springer-Verlag, New York 1977, 1978.

[7] Pázman, A., Foundations of Optimum Experimental Design, Mathematics and its Applications (East European Series), Reidel Publ. Comp., Dordrecht 1986.

[8] Protter, Ph. E., Stochastic Integration and Di®erential Equations, 2nd edition, SpringerVerlag, New York 2004.

[9] Resnick, S. F., Adventures in Stochastic processes, Birkhäuser, Basel 1992.

[10] Ross, S., Stochastic Processes, John Wiley, New York 1996. 11. Schuss, Z., Theory and Applications of Stochastic Processes, an Analytical Approach, Applied Mathematical Sciences Vol. 170, Springer-Verlag 2010.

[11] Seber, G.A.F., and Wild, G. A., Nonlinear Regression, John Wiley & Sons, New York 1989.

[12] Shiryaev, A. N., Probability, 2nd ed., Graduate Texts in Mathematics Vol. 95, Springer-Verlag, New York 1996.

Grading

	Criterion	Points	Cut-off points
1.	Written assignment	25	13
2.	Project	25	12
3	Final exam	50	30
Total		100	55