Course title	**Markov processes with discrete state space.**
Volume *(number of credit points)*	2
Volume *(number of contact hours)*	32
Number of lectures	26
Number of seminars, practical and laboratory works	6
Course level: 1-4 – bachelor; 5-6 – master; 7 – doctoral; T – further education	5
Prerequisites	Probability theory. Mathematical statistics.
Science field, science sub-field	Mathematics
Equivalent course	-

COURSE DESIGNER(S)

Name	*Surname*	*Personal ID No*
Viktorija	Carkova	200540-10107

COURSE ABSTRACT

The aim of this course is to explain to mathematical specialty students the main concepts of the Markov process theory and its applications; to study the most useful in applied probability counting processes with emphasis on the Poisson process; to acquaint with contemporary approach to stochastic processes modeling based on Markov property, including the differential Chepmen-Kolmogorov equations; to explain the ergodic theorem and its application to the queuing theory, including the Erlang's formulae.

RESULTS

On completion of the course the students should be able to describe the general principles of Markov processes; to state the essential features of a Markov chain with discrete and continuous time, to calculate the stationary distribution, to derive and analyze the Chapman-Kolmogorov difference and differential equations; to define a Poisson process, derive the distribution of the number of events in a given time interval, derive the distribution of inter-event times, and apply these results, to solve the Kolmogorov differential equations and to derive the Erlang's formulae.

REQUIREMENTS FOR AWARDING CREDIT POINTS

The examination for course (100%)

COURSE PLAN

No.	*Topic*	*Planned amount in hours*
1.	**Markov chains**	**2**
2.	**Chapman-Kolmogorov equations**	**4**
3.	**Classification of states of Markov chains**	**4**
4.	**Absorbent Markov chains**	**2**
5.	**Ergodic Markov chains ķēdes**	**6**
6.	**Poisson process**	**4**
7.	**Continuous time Markov processes with**	**4**

	discrete state space	
8.	**Birth and death process**	**2**
9.	**Erlang's formulae**	**4**

LITERATURE

Basic textbooks

1.	**V. Carkova. Markova ķedes. R:LU,2001**
2.	**W.Feller. Introduction to Probability Theory and its Application.Vol.I,II. NY: John Wiley&Sons Inc,1957**
3.	**V.Carkova, D.Kalniņa. Gadījuma procesi. R:LU, 1981**

Further reading Basic textbooks

1.	**A. Borovkovs. Varbūtību teorija.M:Nauka,1986 (kriev.)**
2.	**Sh.M.Ross. Introduction of Probability Models. Fifth Edition, Acad.Press, NY, 1995.**
3.	**A.Francis. Advanced Level Statistics. Stanley Thornes LTD, Great Britain, 1979**

Periodicals, internet resources and other sources

1.	**http://www.math.nyu.edu/faculty/varadhan/limittheorems.html**
2.	**http://en.wikipedia.org/wiki/Stochastic_process**