Course title	Probability theory
Volume *(number of credit points)*	4
Volume *(number of contact hours)*	64
Number of lectures	32
Number of seminars, practical and laboratory works	32
Course level: 1-4 – bachelor; 5-6 – master; 7 – doctoral; T – further education	2
Prerequisites	Algebra, Calculus
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 acquaint the mathematical specialty students with the grounding concepts, methods, and the most essential results of the contemporary probability theory. The course is based on the axiomatic approach to probability, which supposes to apply the measure and integral theory as a tool for proof of the main probabilistic theorems. In particular the concepts of random variable, probability distribution, expectation and conditional expectation will be discussed, the large number low and central limit theorem will be proveded, the main probability distributions and its numerical characteristics will be studied.

RESULTS

On completion of the course the students should be able to explain what is meant an axiomatic approach to probability, to define the distribution function of discrete and continuous random vectors, to derive the expectation as an integral by distribution function, to apply the conditional expectation technique for correlation analysis of two random variables, to apply the central limit theorem to asymptotical analysis of random series.

REQUIREMENTS FOR AWARDING CREDIT POINTS

Practical work (10%). Intermediate test (30%). Resulting test – exam (60%).

COURSE PLAN

No.	*Topic*	*Planned amount in hours*
1.	**The main formulae and concepts of the probability theory**	**4**
2.	**Probability measure. Properties.**	**4**
3.	**Discrete distributions. Examples.**	**4**
4.	**Independent trails. Bernoulli trails**	**4**
5.	**Rudiments of the probability theory. Axioms of Probability**	**4**
6	**Random variables**	**4**
7	**Distribution function of random variable**	**6**

8	**Multivariate distributions**	**4**
9.	**Function of random variables**	**6**
10.	**Numerical characteristics of random variables**	**4**
11.	**Limit theorems**	**6**
12.	**Characteristic functions**	**4**
13.	**Limit theorems for characteristic functions**	**4**
14.	**Central limit theorem**	**2**
15.	**Applications of the central limit theorem**	**4**

LITERATURE

Basic textbooks

1.	**V.Carkova, M.Buiķis. 25 lekcijas varbūtību reorija. LU, Rīga, 1975.**
2.	**Uzdevumi varbūtību teorijā. Sastādītais J. Lapiņš. LU, Rīga, 1981.**
3.	**J.Smotrovs. Varbūtību teorija un matemātiskā statistika. Zvaigzne 2004.**

Further reading

1.	**Sh.M.Ross. Introduction of Probability Models. Fifth Edition, Acad.Press, NY, 1995.**
2.	**A.Francis. Advanced Level Statistics. Stanley Thornes LTD, Great Britain, 1979**
3.	**A.Borovkov. ProbabilityTheory. M:Nauka.1986. (Rus.)**
4.	**Krastiņš O. Varbūtību teorija un matemātiskā statistika. R.: Zvaigzne,1978.**

Periodicals, internet resources and other sources

1.	**http://homepages.nyu.edu/~eo1/books.html**
2.	**http://www-ee.stanford.edu/~gray/arp.pdf**
3.	**http://www.dartmouth.edu/~chance/teaching_aids/books_articles/probability_book/book.html**
4.	**http://www.math.nyu.edu/faculty/varadhan/limittheorems.html**